

2010 1-Hour Sulfur Dioxide Standard
—
Proposed Options for Area Boundary Recommendations
July 2016 Designations

**Prepared for the
Missouri Air Conservation Commission**



**Public Hearing
August 27, 2015**

**Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
Jefferson City, Missouri**

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PURPOSE

The purpose of this draft document is to provide public notice and solicit public comment on possible recommendations for area designations for the 2010 1-hour sulfur dioxide (SO₂) standard. This document addresses four parts of the State of Missouri: the areas surrounding the Sikeston Power Station, Sibley Generating Station, Ameren Labadie Energy Center and the SO₂ monitor located in Iron County, Missouri.

The U.S. Environmental Protection Agency (EPA) identified these four areas as meeting the criteria specified in the March 2, 2015 federal Consent Decree for the next round of SO₂ designations¹. The federal Consent Decree set the schedule for finalizing the remaining rounds of area designations under the 2010 1-hour SO₂ National Ambient Air Quality Standard (NAAQS). For the next round, the decree requires EPA to characterize air quality around sources meeting specific thresholds and designate these areas, along with areas containing violating monitors, no later than July 2, 2016.

The Missouri Department of Natural Resources' Air Pollution Control Program (Air Program) intends to submit recommendations to the EPA in September 2015, and EPA will make a final decision on designations for these areas by the court-ordered deadline of July 2, 2016. If the EPA intends to modify the state's recommendations or needs additional technical justification, they will notify the Air Program 120 days prior to finalizing the designations. For this round of designations, EPA has stated that the "120-day" letters will be released no later than March 2, 2016. Eighteen months after final designations, the Air Program will be required to submit state implementation plans (SIPs) for any nonattainment areas outlining actions that will be taken to meet the 1-hour SO₂ standard.

SUMMARY OF PROPOSED OPTIONS FOR AREA BOUNDARY RECOMMENDATIONS

Sikeston Power Station And Sibley Generating Station

For the Sikeston Power Station and Sibley Generating Station, the Air Program seeks public comment on attainment boundaries consisting of Scott County (Figure 4) and a portion of Jackson County (Figure 7). This is based upon air dispersion modeling using actual emissions and emissions inventory data for these areas.

Ameren Labadie Energy Center

For the area surrounding the Ameren Labadie Energy Center, the Air Program is seeking comment on two options.

Option 1: A recommendation of nonattainment based on air dispersion modeling using actual emissions. The Air Program is proposing a nonattainment area boundary that encompasses all

¹ March 20, 2015 letter from Janet McCabe, U.S. Environmental Protection Agency to Sara Parker Pauley, Missouri Department of Natural Resources.

model-predicted violations of the 1-hour SO₂ standard, the Labadie property boundary, and any nearby ambient SO₂ monitors, and that is bounded by easily recognizable and identifiable landmarks. Under option 1, portions of Franklin and St. Charles counties would be recommended nonattainment (Figure 9) as follows:

- The eastern and western boundaries are Boone and Boles Township boundaries.
- The northern boundary is Missouri Route D and Highway 94.
- The southern boundary is Interstate 44.

Option 2: A recommendation of unclassifiable for the portions of Franklin and St. Charles Counties described above based on available SO₂ monitoring data from nearby ambient air quality monitors.

Iron County Monitor

The violating monitor located in Iron County is expected to attain the standard by the end of 2015. If this occurs, this monitor would no longer be subject to the federal consent decree and the Air Program would not submit a recommendation in this round of SO₂ designations for this area. Though an attaining monitor is the likely outcome, the Air Program is also presenting a proposed boundary (Figure 15) in order to provide input on EPA's nonattainment area designation if the monitor continues to violate the 1-hour SO₂ standard for the 2013-2015 period. This boundary is the portion of Township 34N that is located within Iron County.

Summary

The following table summarizes the information in this document regarding potential area designation recommendations for the primary 1-hour SO₂ standard. The following sections discuss in more detail the data and analysis used to support these options. The map in Figure 1 below also depicts these areas.

Table 1 – Options for Missouri Boundary Recommendations for the 2010 1-hour SO₂ Standard

Affected Area	Proposed Boundary	Options for Area Designation Recommendations
Iron County Monitor	Portion of Iron County	No recommendation based on monitor being in attainment for 2013-2015
Labadie	Portions of Franklin and St. Charles County	Option 1: Nonattainment based on modeling data Option 2: Unclassifiable based on available monitoring data
Sibley	Portion of Jackson County	Attainment
Sikeston	All of Scott County	Attainment

2010 1-hour SO₂ NAAQS Existing and Proposed Nonattainment/Attainment Area Boundaries for Comment

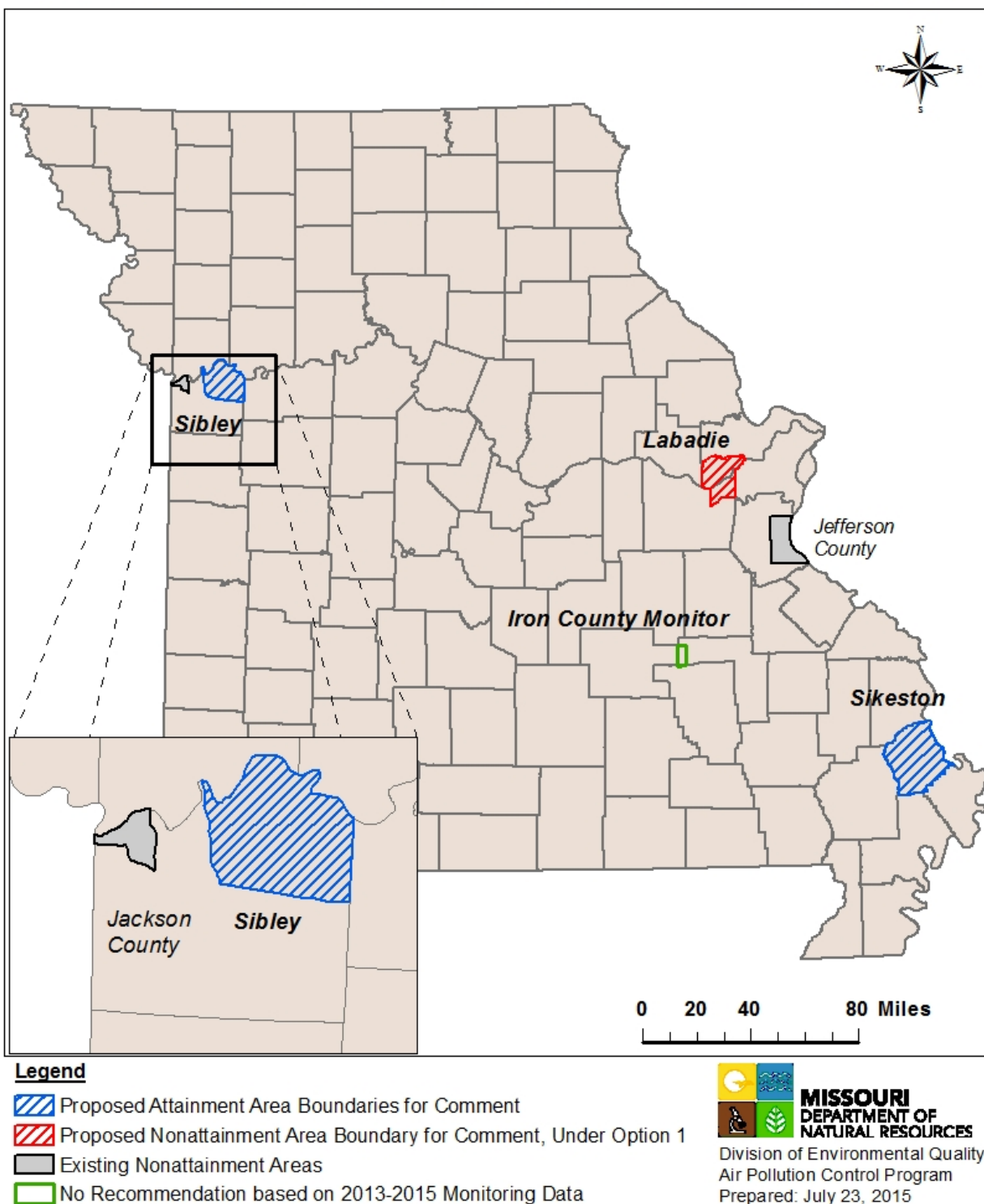


Figure 1 – Existing 1-Hour SO₂ Nonattainment Areas and Proposed Boundaries for July 2016 Round of Designations

BACKGROUND

On June 22, 2010, the EPA established a new 1-hour SO₂ primary National Ambient Air Quality Standard (NAAQS) of 75 parts per billion (ppb), based on the three-year average of the annual 99th percentile of 1-hour daily maximum concentrations (75 FR 35520; June 22, 2010). This new SO₂ standard replaces the previous 24-hour and annual primary SO₂ NAAQS promulgated in 1971 (36 FR 8187; April 30, 1971). Once EPA establishes or revises a NAAQS, the Clean Air Act requires EPA to designate areas as "attainment" (meeting), "nonattainment" (not meeting), or "unclassifiable" (insufficient data).

The EPA has chosen a different approach to determine attainment status for the 1-hour SO₂ NAAQS. Unlike other criteria pollutants, SO₂ is almost exclusively a point source-emitted pollutant. A monitoring network large enough to adequately cover all large sources would be prohibitively expensive and an affordable network would leave large gaps in coverage. Therefore, EPA has decided to use a hybrid monitoring-modeling approach for the implementation of the 1-hour SO₂ standard.

In the March 20, 2015 document, "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard," EPA defines area designation categories for this standard as follows:

- Nonattainment: An area that the EPA has determined violates the 2010 SO₂ NAAQS, based on the most recent three years of ambient air quality monitoring data or an appropriate modeling analysis, or that EPA has determined contributes to a violation in a nearby area.
- Attainment: An area that the EPA has determined meets the 2010 SO₂ NAAQS and does not contribute to a violation of the NAAQS in a nearby area based on either: a) the most recent three years of ambient air quality monitoring data from a monitoring network in an area that is sufficient to be compared to the NAAQS per EPA interpretations in the Monitoring Technical Assistance Document (TAD),² or b) an appropriate modeling analysis.
- Unclassifiable: An area where the EPA cannot determine based on available information whether the area is or is not meeting the 2010 SO₂ NAAQS and whether the area contributes to a violation in a nearby area.

EPA is promulgating designations under this standard for areas throughout the nation in multiple phases. In the initial round, EPA designated areas as nonattainment based on 2010-2012 monitoring data from existing monitors showing a violation of the NAAQS. In Missouri, EPA designated portions of Jackson and Jefferson Counties as nonattainment for the 2010 SO₂ primary NAAQS, effective October 4, 2013. Nonattainment Area (NAA) State Implementation Plan (SIP) revisions have been developed for each of the nonattainment areas. The Jefferson County SIP was adopted by the Missouri Air Conservation Commission and submitted to EPA on May 29, 2015. The Jackson County Nonattainment Area Plan is expected to be adopted

² <http://www.epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf>

August 3, 2015, and will be submitted to EPA once the corresponding state rule has been published in the Code of State Regulations.

Subsequent rounds of designations are prescribed by a consent decree between EPA and the Sierra Club and the Natural Resource Defense Council which was signed and entered by the court on March 2, 2015³. The decree specifies a schedule for the EPA to complete the remaining SO₂ designations for the rest of the country in three additional rounds with three specific deadlines. Within 16 months from the court entered date, or July 2, 2016, EPA must designate areas that contain either a violating monitor or a stationary source that according to the EPA's Air Markets Database:

- Emitted 16,000 tons of SO₂ in 2012; or
- Emitted 2,600 tons of SO₂ and had an average emission rate of at least 0.45 lbs SO₂/MMBtu in 2012.

The last two deadlines for EPA to complete remaining designations are December 31, 2017 and December 31, 2020. The designations completed by these later deadlines are expected to be made pursuant to the EPA's pending Data Requirements Rule for the 1-hour SO₂ NAAQS, anticipated to be final in the Summer or Fall of 2015. EPA also released technical assistance documents for each avenue of characterization, modeling and monitoring, to aid in the technical aspects of using those for designation purposes.

This document provides boundary recommendation options for the four areas in Missouri affected by the federal consent decree: three contain sources and one contains a violating monitor. The three sources affected by the consent decree include the Sikeston Power Station located in Scott County, the Sibley Generating Station located in Jackson County, and the Ameren Labadie Energy Center located in Franklin County. The following is a table of the information EPA used to determine the sources meeting the criteria laid out in the federal consent decree.

Table 2 – Missouri Sources Affected by the March 2, 2015 Federal Consent Decree

Area	2012 Annual Emissions (tons)	2012 Average Emission Rate (lb SO ₂ /mmBTU)	Criteria Met
Sikeston	5,242	0.615	2
Sibley	6,095	0.55	2
Labadie	42,236	N/A	1

The violating SO₂ monitor, known as the Buick Northeast Monitor, is located in northeast Iron County near Bixby, Missouri. This is a source-oriented monitor intended to measure the ambient

³ <http://www.epa.gov/so2designations/pdfs/201503FinalCourtOrder.pdf>

sulfur dioxide (SO₂) concentrations around Buick Resource Recycling Facility (BRRF). This source is a secondary lead smelter that recycles the lead from car batteries through blasting, melting, and refining processes. This monitor is affected by the March 2015 federal consent decree because its 2012 – 2014 design value is in violation of the 2010 1-hour SO₂ standard.

The options presented in this document are based on EPA’s March 20, 2015 “Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard.” This guidance provides information on the recommended process for designating areas under the 2010 revised SO₂ NAAQS. In this document, EPA lists five factors to be considered when developing boundary designation recommendations:

- Monitoring/Modeling data
- Emissions information, including growth, controls, and regional emission reductions
- Meteorology
- Topography
- Jurisdictional boundaries

The Air Program developed the options for 1-hour SO₂ boundary recommendations based on these five factors. The following sections detail the technical analysis performed for each of the four affected areas. Each area analysis evaluates the five factors as they apply to the individual area and details the rationale for the proposed options. The modeling protocol for all area modeling analyses is included in Appendix A. The protocol details all the modeling conditions and procedures utilized in the evaluations. The supporting modeling files for each area are included for reference in Appendix E. Certain lengthy modeling files are excerpted in these documents for brevity, but the complete set of all modeling inputs used for these analyses are available from the Air Program upon request. As established in EPA’s modeling TAD⁴, modeling for designation purposes should be done using actual emissions to act as a surrogate for monitoring data. Hourly emissions, recorded by Continuous Emissions Monitoring Systems (CEMS), are the best option for source characterization, but for sources without hourly recorded emissions, additional justification is required.

PROPOSED BOUNDARIES FOR 1-HOUR SO₂ ATTAINMENT

The proposal of attainment for the two areas surrounding the Sikeston Power Station and Sibley Generating Station was based on air dispersion modeling using actual emissions data. This section provides technical justification to support an attainment recommendation for these areas.

A. SIKESTON POWER STATION

The Sikeston Power Station is a coal-fired electric generating facility located in Scott County, Missouri. Based on the Air Program’s technical review of this facility, current conditions support a recommendation of attainment for all of Scott County.

⁴ <http://www.epa.gov/oaqps001/sulfurdioxide/pdfs/SO2ModelingTAD.pdf>

A.1 Monitoring and Modeling Data

There are no ambient SO₂ monitors near Sikeston that can be relied upon to characterize the air quality around the source. Instead, the Air Program performed extensive air dispersion modeling to characterize air quality for the area. The Air Program modeled Sikeston using the most recent three years of actual emissions data and concurrent representative meteorological data to approximate a monitored design value for the area. The following paragraphs summarize the modeling analysis performed, and the modeling protocol in Appendix A contains more detail on the modeling approach.

The most recent three years (2012-2014) of hourly emissions (CEMS) data was obtained through EPA's Clean Air Markets Division program database (CAMD) and the downloaded SO₂ hourly mass emissions data was formatted for direct input into AERMOD. Sikeston provided hourly recorded varying stack release parameters including exit temperature and exit flow rate that were evaluated and paired with the CAMD retrieved CEMS emissions. The exit flow rate is also reported to CAMD in units of standard cubic feet per hour (SCFHR). The facility provided both actual flow and actual temperature data which was converted and compared to CAMD retrieved data. This comparison revealed no discrepancies between the two datasets. Further emissions information including interactive source evaluation is included in Section A.2.

The representative meteorological stations used in this modeling analysis are shown in Table 3. The memorandum from the Air Program staff meteorologist justifying the selection of these datasets is included in Appendix B. The concurrent three years of meteorological data were paired with the hourly emissions years noted above.

Table 3 – Sikeston Power Station Meteorological Datasets

Facility of Interest	Surface Data Location	Upper Air Location
Sikeston Power Station	Cape Girardeau, MO	Springfield, MO

The chosen modeling domain and receptor grid along with other modeling conditions are detailed in the modeling protocol contained in Appendix A. For purposes of evaluating the entire county, the receptor grid was expanded to cover all of Scott County using the parameters discussed in the modeling protocol.

The regional background concentration was established at 9 ppb for rural areas. This was based on an analysis of the East St. Louis monitor in Illinois. See Appendix A for details of this analysis. The background was added to model predicted concentrations to account for natural sources and sources not included in the modeling inventory. The maximum modeled concentration for the area was 97.62 µg/m³ or 37.22 ppb. This demonstrates the area is currently in compliance with the 1-hour SO₂ standard of 75 ppb.

Although the Air Program analysis of the background concentration identifies a concentration that is representative of background for this area, the Air Program also evaluated a nearby, upwind ambient SO₂ monitor located in Jefferson County for comparison. The Mott Street monitor (AQS Site # 29-099-0027), located near the Doe Run Herculaneum lead smelter that ceased operations at the end of 2013, measured a fourth high value of 18 ppb in 2014. If this concentration were substituted as a more conservative background concentration the maximum

modeled concentration would increase to 46.22 ppb which is still below the level of the standard. Since the modeling analysis resulted in no modeled violations, the Air Program seeks public comment on an attainment boundary for this area. A map including plotted output concentrations is shown below in Figure 2.

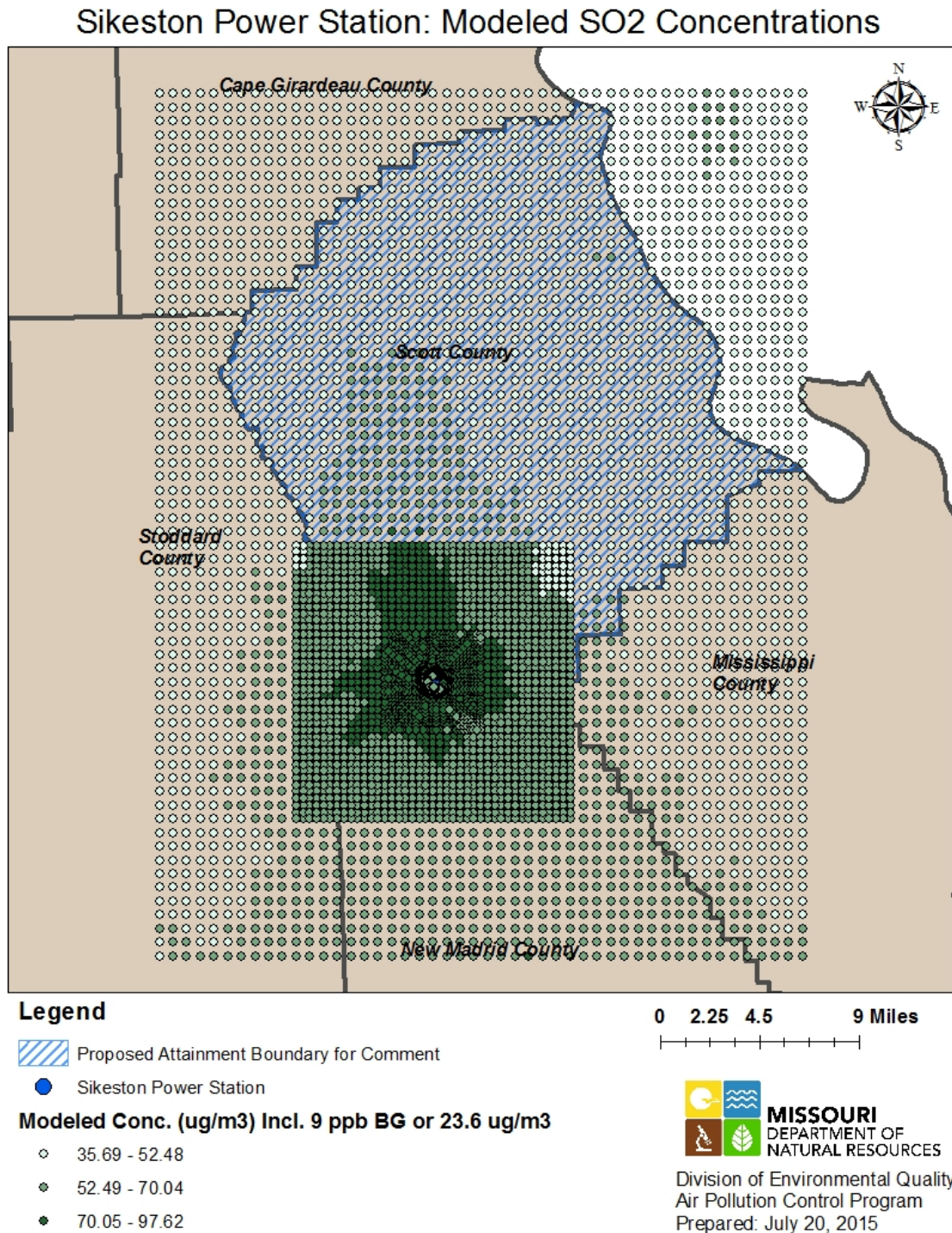


Figure 2 – Sikeston Power Station Modeled SO₂ Concentrations

A.2 Emissions Data

The emissions sources surrounding Sikeston were evaluated to determine an interactive source inventory for the dispersion modeling analysis. Figure 3 displays a map of Scott, New Madrid, Stoddard, Mississippi, and Cape Girardeau Counties along with all permitted SO₂ sources within 20 km of Sikeston that were evaluated for inclusion in the modeling inventory. Sources outside 20 km but within 50 km of Sikeston were also evaluated to ensure all potential impacts are being addressed. Noranda Aluminum and AECI New Madrid power station were identified as large sources within this area and were included in the interactive source inventory. Three other sources, Havco Wood Products, Q.C. Corporation, and Buzzi Unicem Cape Girardeau, are located between 20 km and 50 km from Sikeston and were included as interactive sources. Apart from these sources, there were no other sources outside 20 km but within 50 km of Sikeston with SO₂ emissions greater than 10 tons per year. Table 4 lists all sources included on the map along with their 2012-2014 actual emissions.

Sikeston Power Station: Interactive Source Evaluation

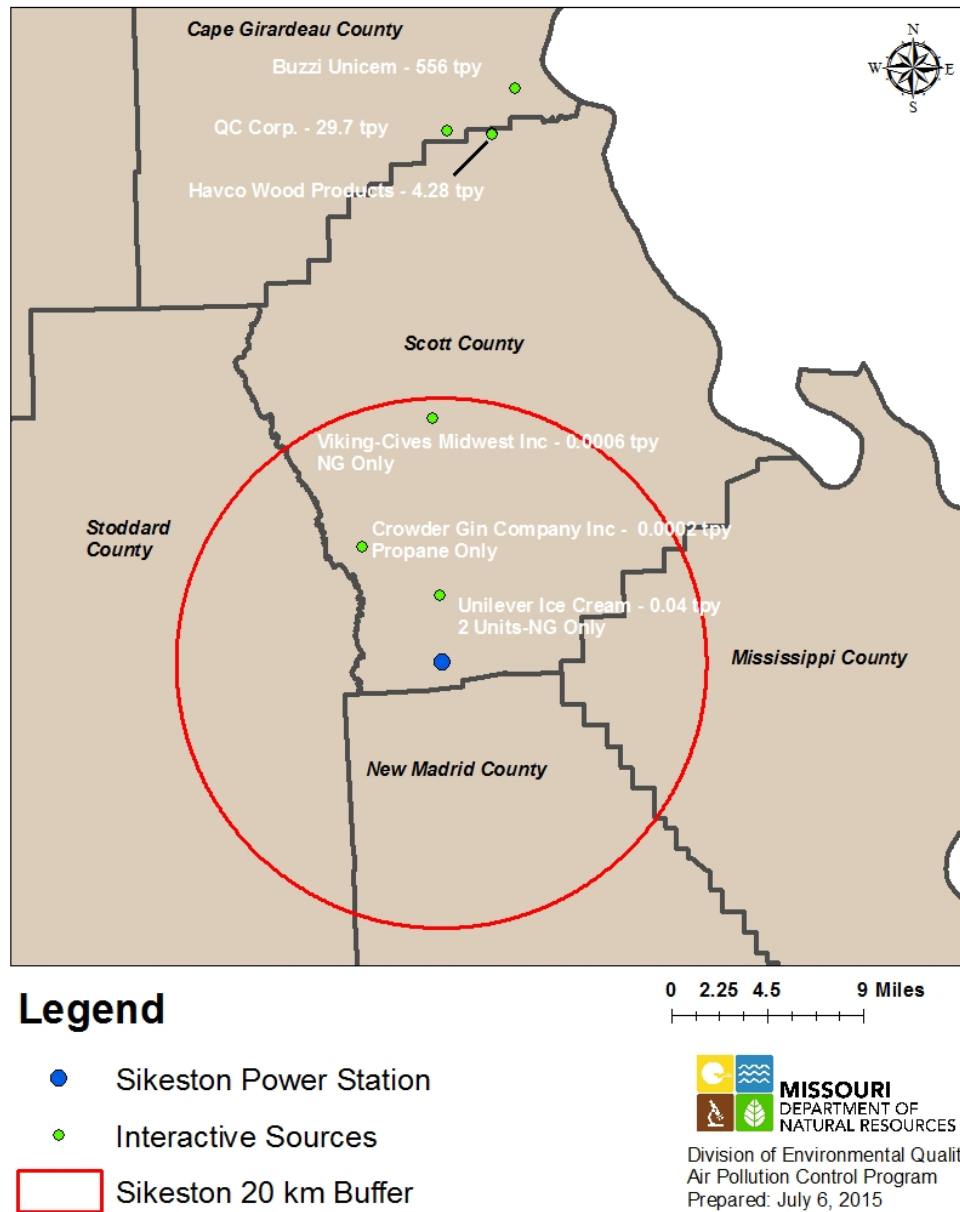


Figure 3 – Sikeston Power Station with Nearby Interactive Sources

Table 4 – Sikeston Power Station and Interactive Source 2012-2014 SO_x Emissions

Source Name	2012 SO _x Emissions (TPY)	2013 SO _x Emissions (TPY)	2014 SO _x Emissions (TPY)
Sikeston Power Station	5,242	5,967	6,651
Unilever Ice Cream	0.04	0.04	0.04
Viking-Cives – Midwest Inc.	0.0006	0.0006	0.0006
Crowder Gin Company Inc.	0.0002	0.0002	0.0002
Havco Wood Products Inc.	3.83	3.54	4.28
Q.C. Corporation	29.71	29.71	29.71
Buzzi Unicem Cape Girardeau	916.07	654.59	556.81
Noranda Aluminum	5,260	5,062	5,323
AECI New Madrid Plant	14,400	16,822	16,672

A.2.1 Evaluation of Sources to Model

All sources included on the map in Figure 3 were evaluated for possible inclusion in the modeling inventory. The following bullets describe each of the sources listed in Table 4 along with a discussion about how each source will be characterized in the modeling analysis:

- Sikeston Power Station – This source is included in the March 2015 federal consent decree. Sikeston includes one coal-fired boiler that generates electricity that is supplied to the grid. The plant is owned by Sikeston Board of Municipal Utilities. The Air Program used actual SO₂ emissions data from the continuous emission monitoring system (CEMS) located at this facility. The modeled years include the most recent three years (2012 – 2014). The use of CEMS data in the model for this facility allows the model to act as a surrogate for monitoring data, which EPA guidance deems appropriate when developing boundary designation recommendations.
- Unilever Ice Cream – This source is located within 20 km of Sikeston. This source is an ice cream and frozen desserts manufacturing plant with total SO₂ emissions less than 0.1 ton per year. This source primarily burns natural gas or propane. This source was not included in the modeling inventory and is accounted for with the regional background concentration.
- Viking Cives – Midwest Inc. – This source is located within 20 km of Sikeston. This source is a truck and bus body manufacturing plant with total SO₂ emissions less than 0.1 ton per year. This source primarily burns natural gas or propane. This source was not included in the modeling inventory and is accounted for with the regional background concentration.
- Crowder Gin Company Inc. – This source is located within 20 km of Sikeston. This source is a cotton ginning plant with total SO₂ emissions less than 0.1 ton per year. This source primarily burns natural gas or propane. This source was not included in the modeling inventory and is accounted for with the regional background concentration.

- Havco Wood Products – This source is not located within 20 km of Sikeston but is the only other permitted SO₂ emitting source in Scott County, therefore was included in the evaluation. This source is a wood product manufacturing plant with total SO₂ emissions less than five tons per year. This source is located 40 km away from Sikeston. There are two SO₂ emitting units at this facility; both are sawdust-fired boilers with stack releases. These two units were modeled at 2014 reported actual emissions.
- Q.C. Corporation - This source is located within 50 km of Sikeston with emissions greater than 10 tons per year; therefore it was included in the evaluation. This source is a chemicals manufacturing plant with total SO₂ emissions less than 30 tons per year. This source is located 40 km away from Sikeston. There are two SO₂ emitting units at this facility; both are monohydrate exhaust stacks. These two units were modeled at 2014 reported actual emissions.
- Buzzi Unicem Cape Girardeau - This source is located within 50 km of Sikeston with emissions greater than 10 tons per year; therefore it was included in the evaluation. This source is a lime kiln operation with total SO₂ emissions greater than 500 tons per year. This source is located 44 km away from Sikeston. There is one major SO₂ emitting unit at this facility; a preheater/precalciner kiln with stack release. This unit was included in the interactive inventory and modeled at 2014 reported actual emissions.
- Noranda Aluminum Inc. – This source is located within 50 km of Sikeston with emissions greater than 10 tons per year; therefore it was included in the evaluation. This source is an aluminum production facility with total SO₂ emissions greater than 500 tons per year. This source is located 40 km away from Sikeston. This source was included at emission rates contained in a recent Prevention of Significant Deterioration (PSD) permit application.
- AECI New Madrid Plant - This source is located within 50 km of Sikeston with emissions greater than 10 tons per year; therefore it was included in the evaluation. This source is an electric generating facility with total SO₂ emissions greater than 500 tons per year. This source is located 40 km away from Sikeston. There are two coal-fired boilers located at this facility with stack releases. These units were included in the interactive inventory and modeled at actual SO₂ emissions for 2012-2014 from the CEMS located at this facility.

Table 5 details the emission release parameters used for the single boiler at Sikeston, and Table 6 shows an excerpt from the hourly emissions file used for the main stack.

Table 5 – Sikeston Power Station Emission Release Parameters

Facility I.D.	Facility Name	Site Name	Emission Point I.D.	Model ID	Description	Release Type
201-0017	City of Sikeston	Sikeston Power Station	1	SIKE1	Boiler #1	POINT

Easting <i>Meters</i>	Northing <i>Meters</i>	Base Elevation <i>Meters</i>	Actual Stack Height <i>Meters</i>	Stack Temperature <i>Kelvin (From MoEIS)</i>	Stack Exit Velocity <i>Meters/Second (From MoEIS)</i>	Stack Diameter <i>Meters</i>
801211.2145	4086783.627	91.72	137.16	Used hourly temperatures in lieu of static values (see Table 6)	Used hourly velocity values in lieu of static values (see Table 6)	4.572

Table 6 – Excerpt from 2012-2014 Hourly CEMS Emission File for Sikeston Power Station

	Year	Month	Day	Hour	Unit ID	SO₂ ER (g/s)	Temp (K)	Velocity (m/s)
SO HOUREMIS	12	1	1	1	SIKE1	185.3419139	358.8509	22.93714587
SO HOUREMIS	12	1	1	2	SIKE1	186.2616936	358.6689	22.82093519
SO HOUREMIS	12	1	1	3	SIKE1	185.9341008	346.7692	20.89497188
SO HOUREMIS	12	1	1	4	SIKE1	164.5145731	346.2722	20.8365688
SO HOUREMIS	12	1	1	5	SIKE1	163.6199928	362.8059	23.603649
SO HOUREMIS	12	1	1	6	SIKE1	193.3805367	364.0238	23.7277465
SO HOUREMIS	12	1	1	7	SIKE1	195.5728883	373.5576	25.48595335
SO HOUREMIS	12	1	1	8	SIKE1	212.73371	372.5846	25.5095818

A.3 Meteorology and Topography

Meteorology and topography are interrelated as significant topographical features often cause localized meteorological effects. Due to this related nature, these two factors were evaluated together. Topography and surrounding land features can have a significant impact on the wind patterns and thus the dispersion of air pollutants from emission sources. There are no significant terrain features in the area around Sikeston that would greatly impact dispersion, such as mountain ranges. However, the Mississippi river valley does form the Eastern county boundary which could cause some localized meteorological effects in the eastern portion of the modeling domain. The surrounding terrain and meteorological effects were represented in Sikeston's modeling analysis to best simulate monitoring of the area's ambient air quality. Since no other significant terrain or meteorological features exist around Sikeston, except the river valley which

is used to set the Eastern boundary, topography and meteorology were not used to set the remainder of the proposed area boundary.

A.4 Jurisdictional Boundaries

Attainment area boundaries are typically defined by easily identifiable features such as county, municipal, or township boundaries. Large, immovable features such as rivers or highways can also be used. In this case, the main considerations are that the proposed boundary include the Sikeston Power Station and is easily identifiable.

All permitted SO₂ emitting sources located within Scott County were evaluated in this analysis, and the receptor grid for this modeling analysis was increased to include the entire county. As discussed previously, the modeling evaluation performed for Sikeston resulted in no modeled violations of the 2010 1-hour SO₂ NAAQS. Therefore, the county boundaries were considered representative of the proposed attainment area. The proposed attainment boundary for Sikeston consists of the county lines for Scott County. Figure 4 displays a map with this proposed boundary.

Northern Boundary: County Line dividing Scott County from Cape Girardeau County

Eastern Boundary: Missouri State Line/Mississippi River and County Line dividing Scott County from Mississippi County

Southern Boundary: County Line dividing Scott County from New Madrid County

Western Boundary: County Line dividing Scott County from Stoddard County

Sikeston Power Station: Proposed 2010 1-hour SO₂ NAAQS Attainment Area Boundary for Comment

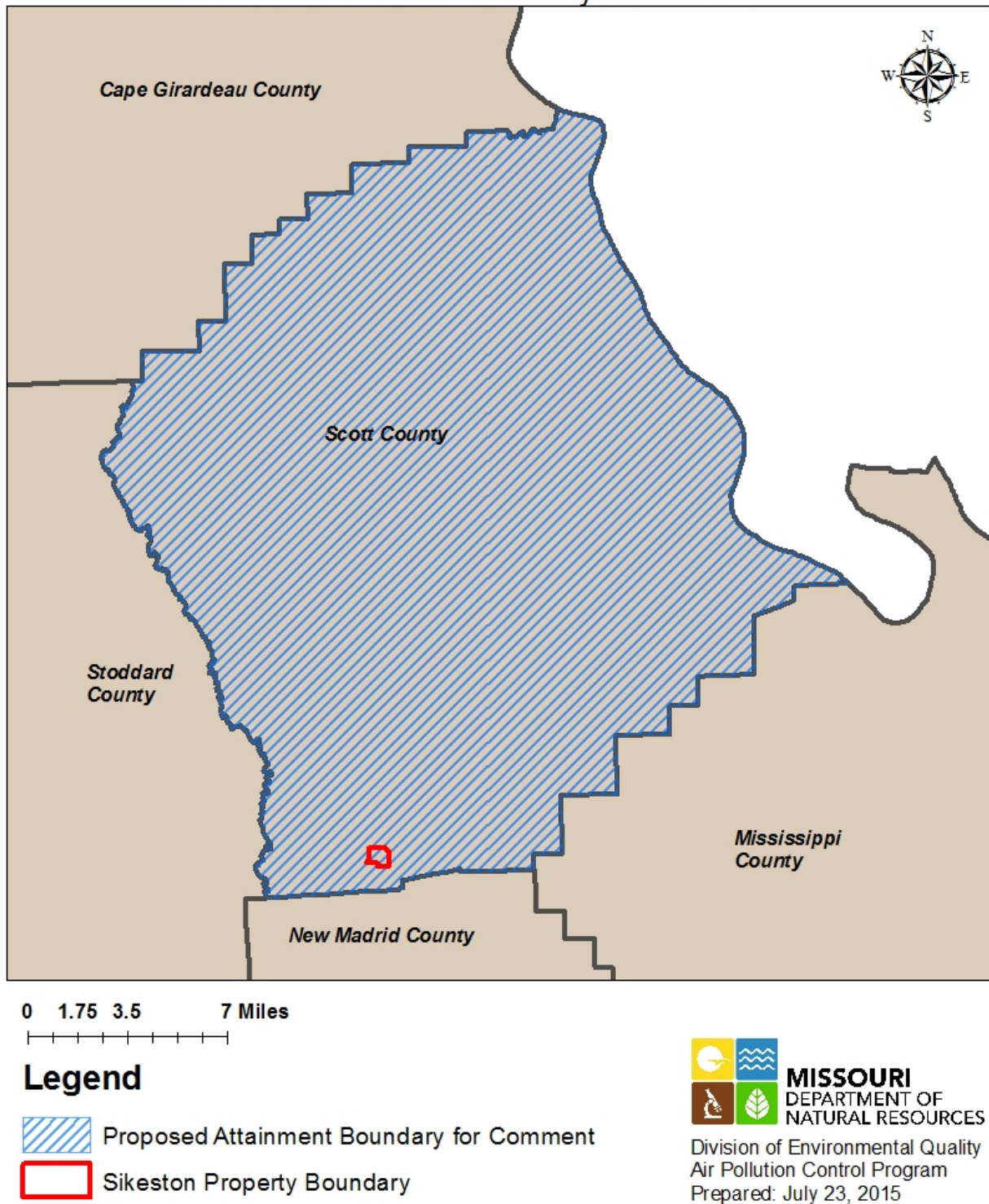


Figure 4 – Sikeston Power Station Proposed 2010 1-hour SO₂ NAAQS Attainment Area

B. SIBLEY GENERATING STATION

The Sibley Generating Station is a coal-fired electric generating facility with three electric generating units operating in Jackson County, Missouri. Based on the Air Program's technical review of this facility, current conditions support a recommendation of attainment for a portion of Jackson County around this emissions source.

B.1 Monitoring and Modeling Data

There are no ambient SO₂ monitors near Sibley that can be relied upon to characterize the air quality around the source. Instead, the Air Program performed extensive air dispersion modeling to characterize air quality for the area. The Air Program modeled Sibley using the most recent three years of actual emissions data and concurrent representative meteorological data to approximate a monitored design value for the area. The following paragraphs summarize the modeling analysis performed while the modeling protocol in Appendix A contains more detail on the modeling approach.

The most recent three years (2012-2014) of hourly emissions (CEMS) data was obtained through EPA's CAMD and the downloaded SO₂ hourly mass emissions data was formatted for direct input into AERMOD. Further emissions information including interactive source evaluation is included in Section B.2.

The representative meteorological stations used in this modeling analysis are shown in Table 7. The memorandum from the Air Program staff meteorologist justifying the selection of these datasets is included in Appendix C. The concurrent three years of meteorological data were paired with the hourly emissions years noted above.

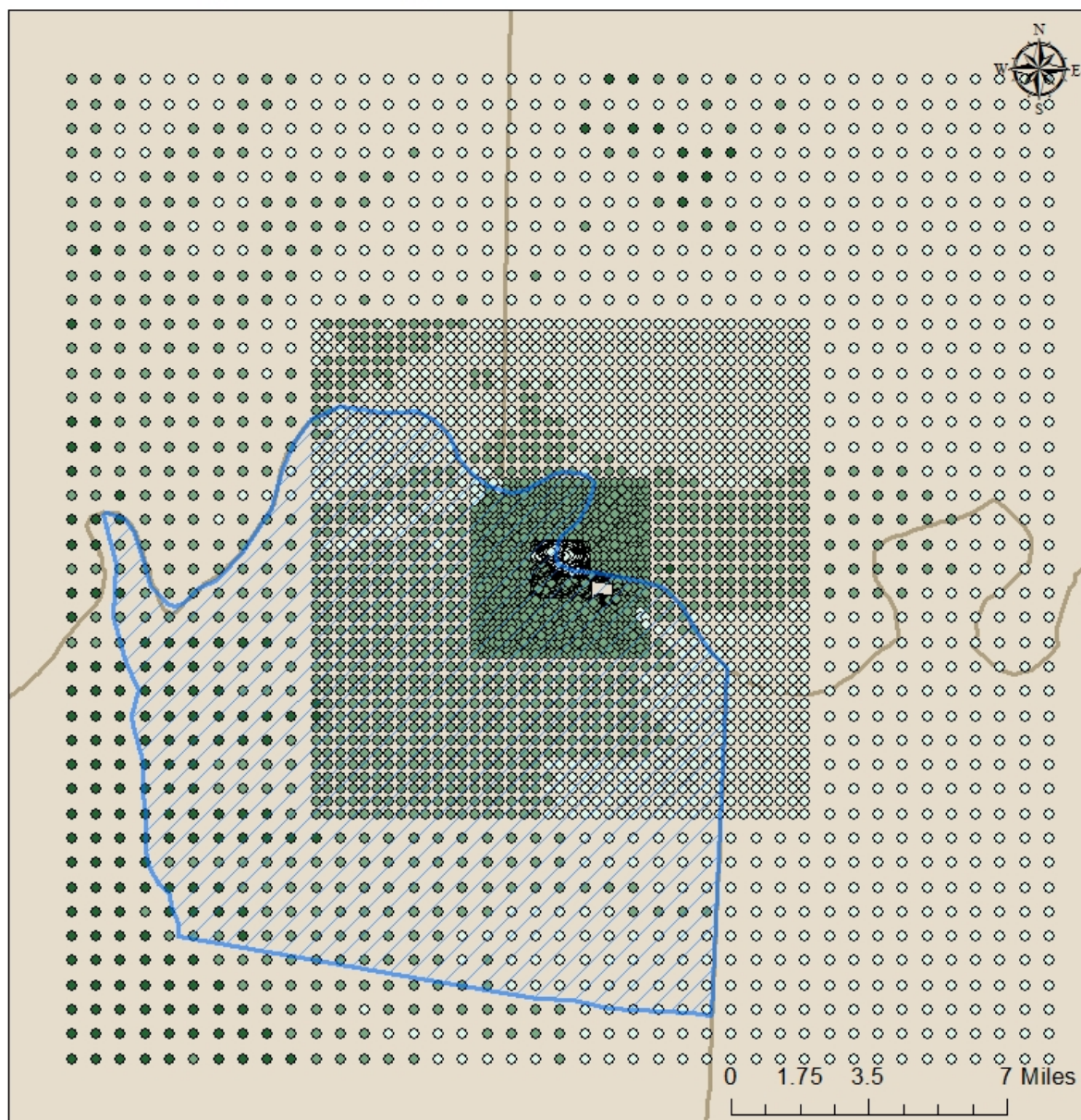
Table 7 – Sibley Generating Station Meteorological Datasets

Facility of Interest	Surface Data Location	Upper Air Location
Sibley Generating Station	Kansas City International Airport, MO	Topeka, KS


The chosen modeling domain and receptor grid along with other modeling conditions are detailed in the modeling protocol contained in Appendix A.

The established regional background concentration for urban areas of 13 ppb was used in this analysis since Sibley is located downwind of a large metropolitan area. This was based on an analysis of the JFK monitor in Kansas. See Appendix A for details of this analysis. The background was added to model predicted concentrations to account for natural sources and sources not included in the modeling inventory. The maximum modeled concentration for the area was 156.72 µg/m³ or 59.7 ppb. This demonstrates the area is currently in compliance with the 1-hour SO₂ standard of 75 ppb. Since the modeling analysis resulted in no modeled violations, the Air Program seeks public comment on an attainment boundary for this area. A map including plotted output concentrations with the proposed attainment area is shown below in Figure 5.

KCPL Sibley Generating Station: Modeled SO₂ Concentrations



Legend

 Proposed Attainment Boundary for Comment

Modeled Conc. (ug/m³) incl. 13 ppb BG or 34.09 ug/m³

- 53.21 - 69.30
- 69.31 - 81.21
- 81.22 - 156.72



Division of Environmental Quality
Air Pollution Control Program
Prepared: July 23, 2015

Figure 5 – Sibley Generating Station Modeled SO₂ Concentrations

B.2 Emissions Data

The emissions sources surrounding Sibley were evaluated to determine the interactive source inventory for the dispersion modeling exercise. Figure 6 displays a map of Jackson, Clay, Ray, and Lafayette Counties along with all permitted SO₂ sources within 20 km of Sibley that were evaluated for inclusion in the modeling inventory.

Sources outside 20 km but within 50 km of Sibley were also evaluated to ensure all potential impacts are being addressed. Four large sources were identified between 20 km and 50 km from Sibley; Veolia Energy, KCP&L Hawthorn, and two power stations located in Kansas. These sources were also evaluated as part of the recently developed Jackson County SO₂ nonattainment area plan. These sources were included in the interactive inventory at 2014 actual emissions, or using CEMS data, if available. Apart from these sources, there were no other sources outside 20 km but within 50 km of Sibley with SO₂ emissions greater than 10 tons per year. Table 8 lists all sources included on the map along with their 2012-2014 actual emissions.

KCPL Sibley Generating Station: Interactive Source Evaluation

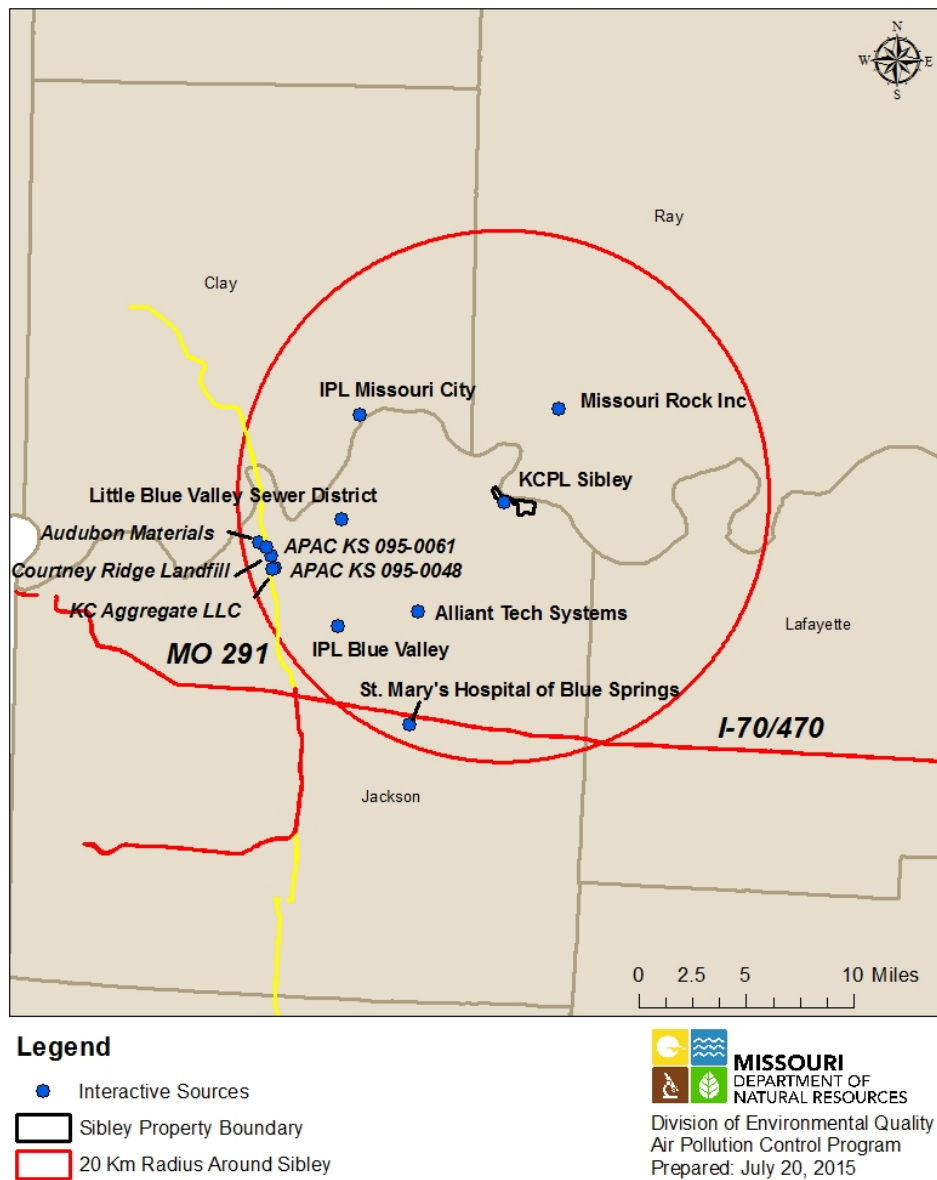


Figure 6 – Sibley Generating Station with Interactive SO₂ Sources within 20 km

Table 8 – Sibley Generating Station and Interactive Source 2012-2014 SO_x Emissions

Source Name	2012 Emissions (tons/year)	2013 Emissions (tons/year)	2014 Emissions (tons/year)
Sibley Generating Station	6,094.80	6,217.97	4,847.20
Blue Valley Station	4,608.47	3,786.76	2,105.30
Missouri City Station	683.86	740.97	0.16
Missouri Rock Inc.	0.67	0.56	0.56
Little Blue Valley Sewer District	1.89	2.28	0.34
Alliant Tech Systems Inc.	1.79	1.35	1.12
St. Mary's Hospital of Blue Springs	0.08	0.08	0.08
Audubon Materials Sugar Creek Plant	115.47	82.81	116.78
Kansas City Aggregate LLC	2.33	2.33	2.33
APAC-Kansas Inc. Sugar Creek (095-0048)	1.10	1.10	1.10
Courtney Ridge Landfill	0.42	0.42	0.59
APAC-Kansas Inc. Sugar Creek (095-0061)	3.38	3.38	3.38
KCPL Hawthorn	1,576	1,727	1,441
Veolia Energy	6,702	7,934	7,782
BPU Quindaro	2,757	2,905	3,684
BPU Nearman	4,611	4,928	5,332

B.2.1 Evaluation of Sources to Model

All sources included on the map in Figure 6 were evaluated for inclusion in the modeling exercise along with the appropriate emission rates to use in the analysis. The Sibley Generating Station and the Blue Valley Station will both be subject to the new state rule, *10 CSR 10-6.261 Control of Sulfur Dioxide Emissions*, which was developed as part of the Jackson County SO₂ Nonattainment Area Plan. In addition, the Missouri City Station has ceased burning coal at their facility and is expected to shut down by 2016. The following bullets describe each of the sources listed in Table 8 along with a discussion about the emission rates used for each source in this modeling exercise:

- **Sibley Generating Station** – This source is included in the March 2015 federal consent decree. The Sibley Generating Station includes three (3) coal-fired boilers that generate

electricity which is supplied to the grid. The plant is owned by Kansas City Power and Light, who recently announced plans to cease burning coal at two of the three boilers at this facility by the end of 2019⁵. The source is subject to emission limits in 10 CSR 10-6.261; however, the Air Program used actual SO₂ emissions data from the CEMS located at this facility. The modeled years include the most recent three years (2012 – 2014). The use of CEMS data in the model for this facility allows the model to act as a surrogate for monitoring data, which EPA guidance deems appropriate when developing boundary designation recommendations.

- Blue Valley Station – This source is located within 20 km of Sibley. This is an electric generating facility with three (3) coal-fired boilers. The source is subject to the new state rule 10 CSR 10-6.261, which requires that all three (3) boilers convert exclusively to natural gas. In addition, this source is subject to the federal Industrial and Commercial Boiler Maximum Achievable Control Technology (Boiler MACT) which requires compliance by January 31, 2016. Blue Valley has indicated their compliance method with the Boiler MACT is the conversion of all three boilers to exclusively burn natural gas. Therefore, potential SO₂ emissions from this source were modeled assuming natural gas is the only fuel combusted in these three (3) boilers.
- Missouri City Station – This source is located within 20 km of Sibley. This is an electric generating facility with one (1) coal-fired boiler. The source ceased burning coal in 2013 and is expected to shut down by 2016. The total actual SO₂ emissions in 2014 were less than 0.5 tons per year. Therefore, this source was not included in the interactive source inventory.
- Missouri Rock Inc. – This source is located within 20 km of Sibley. This source is a limestone mining and quarrying plant with total SO₂ emissions less than 1 ton per year. Due to the proximity of the source to Sibley, this source was included in the modeling inventory at actual reported SO₂ emissions from all units.
- Little Blue Valley Sewer District – This source is located within 20 km of Sibley. This source is a sewage treatment plant with total SO₂ emissions less than 5 tons per year. Due to the proximity of the source to Sibley, this source was included in the model inventory at actual reported SO₂ emissions from all units other than emergency generators, space heaters, and zero emitting units, which were excluded.
- Alliant Tech systems Inc. – This source is located within 20 km of Sibley. This source is a small ammunition manufacturer with total SO₂ emissions less than 2 tons per year. Due to the proximity of the source to Sibley, this source was included in the model inventory at actual reported SO₂ emissions from all units other than emergency generators, space heaters, and zero emitting units, which were excluded.

⁵ <http://www.kcpl.com/about-kcpl/media-center/2015/january/kcpl-announces-plans-to-cess-burning-coal-at-three-plants>

- St. Mary's Hospital of Blue Springs – This source is located within 20 km of Sibley. This source is a hospital with total SO₂ emissions less than 0.1 ton per year. Due to the proximity of the source to Sibley, this source was included in the modeling inventory at actual reported SO₂ emissions from all units other than the emergency generator, which was excluded.
- Audubon Materials Sugar Creek Plant – This source is located within 20 km of Sibley. This source is a cement kiln operation with average annual SO₂ emissions over 100 tons per year. Due to the proximity of the source to Sibley, this source was included in the modeling inventory at actual reported SO₂ emissions. The only SO₂ emitting unit at this facility is a preheater/precalciner rotary kiln with a stack release.
- Kansas City Aggregate LLC., Independence Quarry – This source is located within 20 km of Sibley. This source is a limestone quarry operation with total SO₂ emissions less than 5 tons per year. Due to the proximity of the source to Sibley, this source was included in the modeling inventory at actual reported SO₂ emissions. The only SO₂ emitting unit at this facility is a diesel engine.
- Courtney Ridge Landfill, LLC. – This source is located within 20 km of Sibley. This source is a landfill operation with total SO₂ emissions less than 1 ton per year. There are two SO₂ emitting units at this facility, both are 2,000 SCFM flares. The two flares are reported as fugitive release so the default volume source parameters for miscellaneous equipment were used. Due to the proximity of the source to Sibley, this source was included in the modeling inventory at actual reported SO₂ emissions.
- APAC-Kansas LLC. Sugar Creek Plant (095-0048) – This source is located within 20 km of Sibley. This source is an asphalt operation with total SO₂ emissions less than 5 tons per year. The only SO₂ emitting unit at this facility is a generator with no release parameters. The default volume source parameters for a generator were used. Due to the proximity of the source to Sibley, this source was included in the modeling inventory at actual reported SO₂ emissions.
- APAC-Kansas LLC. Sugar Creek Plant (095-0061) – This source is located within 20 km of Sibley. This source is an asphalt operation with total SO₂ emissions less than 5 tons per year. There are two SO₂ emitting units at this facility, a drum dryer and an asphalt heater. The drum dryer releases to a stack but the heater is a fugitive release so the default volume source parameters for heaters were used. Due to the proximity of the source to Sibley, this source was included in the modeling inventory at actual reported SO₂ emissions.
- KCPL Hawthorn Station – This source is located within 50 km of Sibley, with emissions greater than 10 tpy; therefore it was included in the evaluation. This source includes one coal-fired boiler and three combustion turbines. This source was included in the interactive inventory and modeled at actual SO₂ emissions data from the CEMS located at this facility. The modeled years include the most recent three years (2012 – 2014).

- Veolia Energy – This source is located within 50 km of Sibley, with emissions greater than 10 tpy; therefore it was included in the evaluation. This source includes two coal-fired boilers and two natural gas fired boilers. This source was included in the interactive inventory and modeled at 2014 actual SO₂ emissions data as reported to MoEIS.
- BPU (Board of Public Utilities) Quindaro – This source is located in Kansas, within 50 km of Sibley, with emissions greater than 10 tpy; therefore was included in the evaluation. BPU Quindaro has two coal-fired boilers. This source was included in the interactive inventory and modeled at actual SO₂ emissions data from the CEMS located at this facility. The modeled years include the most recent three years (2012 – 2014). Other lower emitting units were included at recent actual emissions.
- BPU Nearman - This source is located in Kansas, within 50 km of Sibley, with emissions greater than 10 tpy; therefore was included in the evaluation. BPU Nearman has one coal-fired boiler. This source was included in the interactive inventory and modeled at actual SO₂ emissions data from the CEMS located at this facility. The modeled years include the most recent three years (2012 – 2014). Other lower emitting sources were included at recent actual emissions.

Table 9 details the emission release parameters used for the three boilers at Sibley, and Table 10 shows an excerpt from the hourly emissions file used for the boilers.

Table 9 – Sibley Generating Station Emission Release Parameters

Facility I.D.	Facility Name	Site Name	Emission Point I.D.	Model ID	Description	Release Type
095-0031	KCP&L GMO	Sibley Generating Station	5A	SIB5A	Boiler #1	POINT
095-0031	KCP&L GMO	Sibley Generating Station	5B	SIB5B	Boiler #2	POINT
095-0031	KCP&L GMO	Sibley Generating Station	5C	SIB5C	Boiler #3	POINT

Easting	Northing	Base Elevation	Actual Stack Height	Stack Temperature	Stack Exit Velocity	Stack Diameter
<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	<i>Kelvin</i>	<i>Meters/Second</i>	<i>Meters</i>
397714.92	4337276.49	221.89	212.14	427.761111	30.1212515	4.1148
397714.92	4337276.49	221.89	212.14	427.761111	30.1212515	4.1148
397714.92	4337276.49	221.89	212.14	427.761111	30.1212515	4.1148

Table 10 – Excerpt from 2012-2014 Hourly CEMS Emission File for Sibley Generating Station

	Year	Month	Day	Hour	Unit ID	SO₂ ER (g/s)	Temp (K)	Velocity (m/s)
SO HOUREMIS	12	1	1	1	SIB5A	0	427.76111	30.12125
SO HOUREMIS	12	1	1	1	SIB5B	0	427.76111	30.12125
SO HOUREMIS	12	1	1	1	SIB5C	243.3384353	427.76111	30.12125
SO HOUREMIS	12	1	1	2	SIB5A	0	427.76111	30.12125
SO HOUREMIS	12	1	1	2	SIB5B	0	427.76111	30.12125
SO HOUREMIS	12	1	1	2	SIB5C	248.340525	427.76111	30.12125
SO HOUREMIS	12	1	1	3	SIB5A	0	427.76111	30.12125
SO HOUREMIS	12	1	1	3	SIB5B	0	427.76111	30.12125
SO HOUREMIS	12	1	1	3	SIB5C	240.85629	427.76111	30.12125

B.3 Meteorology and Topography

Meteorology and topography are interrelated as significant topographical features often cause localized meteorological effects. Due to this related nature, these two factors were evaluated together. Topography and surrounding land features can have a significant impact on the wind patterns and thus the dispersion of air pollutants from emission sources. There are no significant terrain features in the area around Sibley that would greatly impact dispersion, such as mountain ranges. However, the Missouri river valley does form the Northern/Northeastern boundary which could cause some localized meteorological effects. The surrounding terrain and meteorological effects were represented in Sibley's modeling analysis to best simulate monitoring of the area's ambient air quality. Since no significant terrain or meteorological features exist around Sibley, except the river valley which is used to set the Northern/Northeastern boundary, topography and meteorology were not used to set the remainder of the proposed area boundary.

B.4 Jurisdictional Boundaries

Attainment area boundaries are typically defined by easily identifiable features such as county, municipal, or township boundaries. Large, immovable features such as rivers or highways can also be used. As discussed previously, the modeling evaluation performed for Sibley resulted in

no modeled violations of the 2010 1-hour SO₂ NAAQS. Therefore, the main considerations for an attainment area boundary are that it includes the Sibley Generating Station and is easily identifiable. The proposed boundaries for this area consist of highway and county boundary lines that qualify as both easily definable and identifiable jurisdictional boundaries. The proposed attainment boundary is defined below and displayed in the map in Figure 7.

- The northern boundary is the county line separating Jackson County from Clay and Ray Counties.
- The Eastern boundary is the county line separating Jackson County from Lafayette County.
- The Southern boundary is Interstate 70 and 470.
- The Western boundary is Missouri Highway 291.

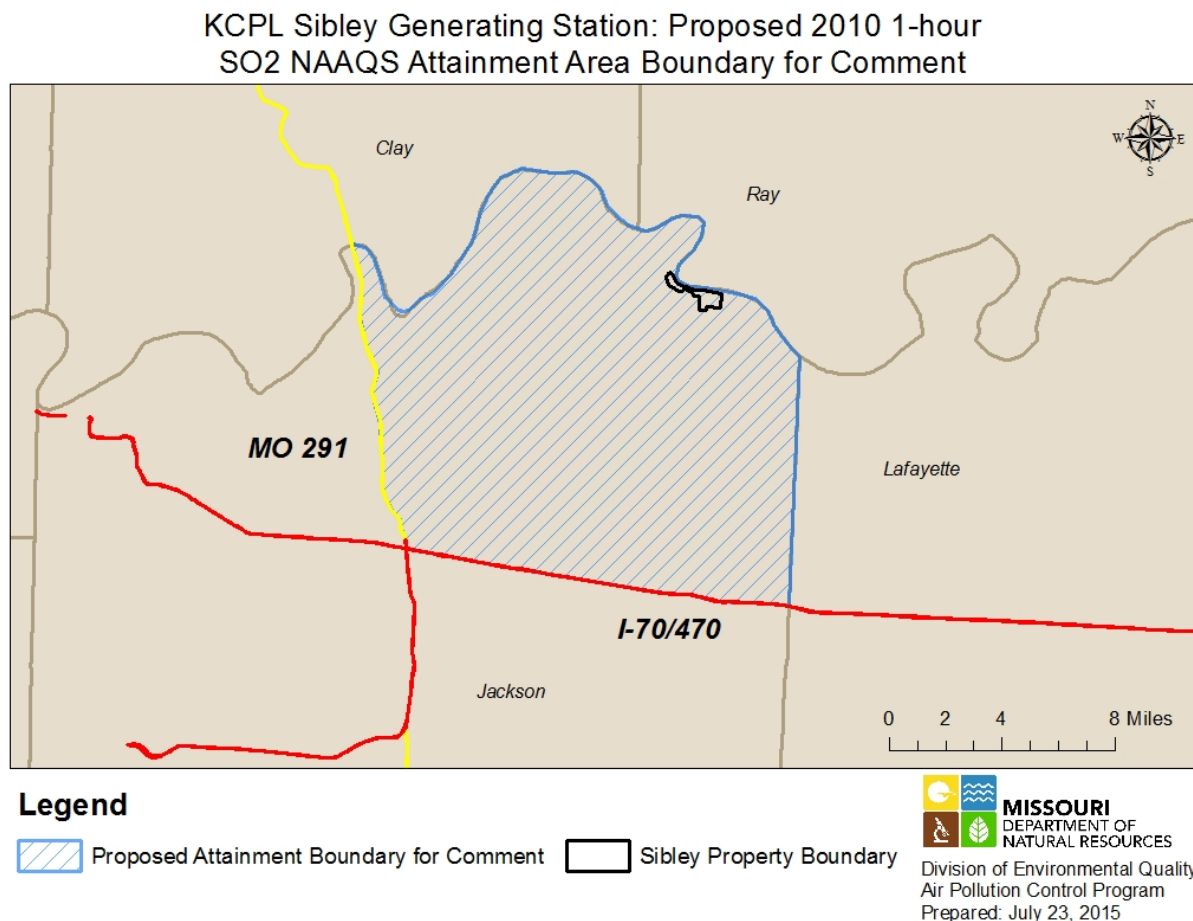


Figure 7 – Sibley Generating Station Proposed 2010 1-hour SO₂ NAAQS Attainment Area

PROPOSED OPTIONS FOR AMEREN LABADIE ENERGY CENTER

The Ameren Labadie Energy Center is a coal-fired electric generating facility located in Franklin County, Missouri. Ameren recently installed and began operating ambient SO₂ monitors and a site-specific meteorological station near Labadie in April 2015. Historical data from MDNR monitors that were near Labadie but are no longer operating is also available. The Air Program is presenting for public comment two designation recommendation options for this area: (1) a nonattainment recommendation based on modeling, and (2) an unclassifiable recommendation based on monitoring data.

C. OPTION 1: NONATTAINMENT BASED ON MODELING

This option presents a proposed nonattainment area boundary based on air dispersion modeling results showing modeled violations of the 1-hour SO₂ standard. The purpose of this section is to address the criteria that the EPA established for considering boundaries less than the full county for nonattainment designation. The criteria are outlined in the EPA's March 2015 updated SO₂ designations guidance.

The guidance instructed states to base the boundary recommendation on an evaluation of five factors: 1) air quality data (monitoring and modeling); 2) emissions-related data; 3) meteorology; 4) geography/topography; and 5) jurisdictional boundaries.

The area containing the Ameren Labadie Energy Center models violations of the 2010 1-hour SO₂ standard using actual emissions. The Air Program evaluated a boundary that is less than the full county and the discussion that follows evaluates the five factors to support the proposed area for option 1.

C.1 Modeling Data

The Air Program performed extensive air dispersion modeling for the area. The Air Program modeled Labadie using the most recent three years of actual emissions data and concurrent representative meteorological data to approximate a monitored design value for the area. The following paragraphs summarize the modeling analysis performed, and the modeling protocol in Appendix A contains more detail on the modeling approach.

The most recent three years (2012-2014) of hourly emissions (CEMS) data was obtained through EPA's CAMD and the downloaded SO₂ hourly mass emissions data was formatted for direct input into AERMOD. Further emissions information including interactive source evaluation is included in Section C.2.

The representative meteorological stations used in this modeling analysis are shown in Table 11. The memorandum from the Air Program staff meteorologist justifying the selection of these datasets is included in Appendix D. The concurrent three years of meteorological data were paired with the hourly emissions years noted above.

Table 11 – Ameren Labadie Energy Center Meteorological Datasets

Facility of Interest	Surface Data Location	Upper Air Location
Ameren Labadie Energy Center	Jefferson City, MO	Lincoln, IL

The chosen modeling domain and receptor grid along with other modeling conditions are detailed in the modeling protocol contained in Appendix A.

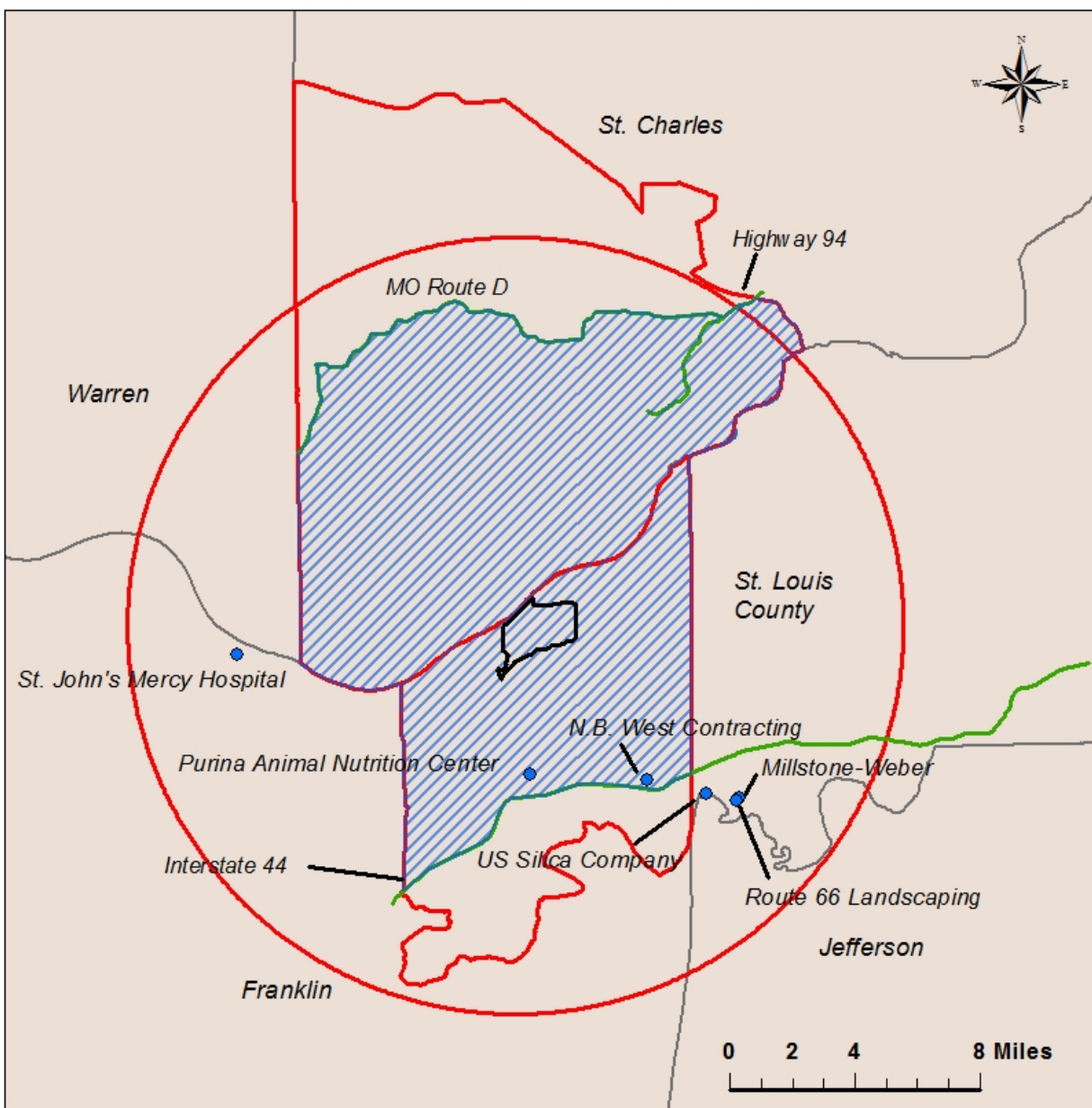
The regional background concentration was established at 9 ppb for rural areas. This was based on an analysis of the East St. Louis monitor. See Appendix A for details of this analysis. The background was added to model predicted concentrations to account for natural sources and sources not included in the modeling inventory. The maximum modeled concentration for the area was 234.5 $\mu\text{g}/\text{m}^3$ or 89 ppb, which is not in compliance with the 1-hour SO_2 standard of 75 ppb.

Although the Air Program analysis of the background concentration identifies a concentration that is representative of background for this area, the Air Program also evaluated a nearby ambient SO_2 monitor located in Jefferson County for comparison. The Mott Street monitor (AQS Site # 29-099-0027), located near the Doe Run Herculaneum lead smelter that ceased operations at the end of 2013, measured a fourth high value of 18 ppb in 2014. If this concentration were substituted as a more conservative background concentration, this would yield a maximum modeled concentration of 98 ppb. Although this does result in additional modeled violations, all model-predicted violations are still contained within the proposed boundary. Since the modeling analysis resulted in modeled violations, the Air Program seeks public comment on a nonattainment boundary for this area.







C.2 Emissions Data

The emissions sources surrounding Labadie were evaluated to determine the interactive sources to include in the dispersion modeling exercise. Figure 8 displays a map of Franklin, Warren, St. Charles, St. Louis, and Jefferson Counties along with all sources evaluated during the analysis. All permitted sources within 20 km of Labadie were evaluated for inclusion in the modeling inventory. Table 12 lists all sources included on the map along with their 2012-2014 actual emissions.

Ameren Labadie Energy Center: Interactive Source Evaluation



Legend

-  Proposed Nonattainment Area Boundary for Comment, Under Option 1
-  Labadie Property Boundary
-  Interactive Sources
-  Federal and State Roadway Boundaries
-  20 km Radius around Labadie
-  Boone and Boles Township Boundaries



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Division of Environmental Quality
Air Pollution Control Program
Prepared: July 23, 2015

Figure 8 – Map of Ameren Labadie Energy Center with Interactive SO₂ Sources within 20 km and Proposed Nonattainment Boundary under Option 1

Table 12 – Ameren Labadie Energy Center and Interactive Source 2012-2014 SO_x Emissions

Source Name	2012 Emissions (tons/year)	2013 Emissions (tons/year)	2014 Emissions (tons/year)
Ameren Labadie Energy Center	42,236	38,384	33,091
Purina Animal Nutrition Center	1.43	1.43	1.43
N.B. West Contracting Co Inc.	3.58	3.58	5.43*
St. John's Mercy Hospital	0.00	0.00	0.00
Millstone-Weber Portable	0.1787	0.1787	0.1787
U.S. Silica Company Pacific	0.0248	0.0248	0.0248
Route 66 Landscape Supply Center Inc.	0.0318	0.0215	0.0215

*2014 Reported emissions were found to include double counting. See source summary below.

C.2.1 Evaluation of Sources to Model

All sources included on the map in Figure 8 were evaluated for inclusion in the modeling exercise along with the appropriate emission rates to use in the analysis. The following bullets describe each of the sources listed in Table 12 along with a discussion about the emission rates used for each source in this modeling exercise:

- Ameren Labadie Energy Center – This source is included in the March 2015 federal consent decree. The Ameren Labadie Energy Center includes four (4) coal-fired boilers that generate electricity which is supplied to the grid. The plant is owned by Ameren Missouri. The source is subject to emission limits in 10 CSR 10-6.261; however, the Air Program used actual SO₂ emissions data from the CEMS located at this facility. The modeled years include the most recent three years (2012 – 2014). The use of CEMS data in the model for this facility allows the model to act as a surrogate for monitoring data, which EPA guidance deems appropriate when developing boundary designation recommendations.
- Purina Animal Nutrition Center – This source is located within 20 km of Labadie. This source is a refuse systems hazardous waste treatment and disposal facility. It has two listed SO₂ emission units in MoEIS. One is a 100 hp Boiler that burns Grades 1 and 2 oil with 2014 reported annual emissions of 1.425 tpy SO₂. The other listed source is facility wide propane use that totals less than 0.004 tpy SO₂ in 2014, which was not included in the modeling inventory. The boiler, or EP 10, is listed as stack release but has no release parameters listed; therefore it must be modeled as a volume source. The default volume source parameters for a boiler without parameters were assumed for this unit.

- N.B. West Contracting Co Inc. Pacific Plant – This source is located within 20 km of Labadie. This source is an asphalt, paving, mixture and block manufacturing plant. The facility total SO₂ emissions for 2014 are listed as 9.6 tpy SO₂. There are four listed SO₂ emission units in MoEIS, EP17, EP5, S-2, and S-3. EP17 is a drag slat conveyor for batch hot mix plant with emissions totaling 4.168 tpy with 1,600 average operational hours per year. This unit is a fugitive release. EP5 is an aggregate dryer with burner and rotary mixer that burns #2 fuel oil. Total emissions for EP5 are 0.6550 tpy SO₂. This unit releases to a combined stack (S-3). S-2 is an asphalt heater/burner that burns distillate oil. S-2 total SO₂ emissions are 0.612 tpy. S-2 releases to a stack with minimal parameters provided so supplementary defaults were necessary. S-3 is a baghouse stack for several processes; total emissions are reported as 4.168 tpy in 2014. This was found to be double counting emissions and the Air Quality Analysis Section is working with the company to correct their information. For the purposes of this analysis, 2013 reported emissions for EP17, EP5, and S2 were utilized. In 2013, S3 was not a reported emission point. The 2014 total emissions contained in Table 12 reflect 2014 reported emissions for all SO₂ emitting units except the unit found to be double counting, S3.
- St. John's Mercy Hospital – This source is located within 20 km of Labadie. This source is a hospital with total SO₂ emissions less than 0.1 ton per year. This source primarily burns natural gas or propane. Therefore, this source was not included in the modeling inventory and is accounted for through the regional background concentration.
- Millstone-Weber Portable – This source is located within 20 km of Labadie. This source is a ready-mix concrete manufacturing plant with total SO₂ emissions less than 0.2 ton per year. This source primarily burns natural gas or propane. Therefore, this source was not included in the modeling inventory and is accounted for through the regional background concentration.
- U.S. Silica Company Pacific – This source is located within 20 km of Labadie. This source is an industrial sand mining operation with total SO₂ emissions less than 0.1 ton per year. This source primarily burns natural gas or propane. Therefore, this source was not included in the modeling inventory and is accounted for through the regional background concentration.
- Route 66 Landscape Supply Center Inc. – This source is located within 20 km of Labadie. This source is a recyclable material merchant wholesaler operation with total SO₂ emissions less than 0.1 ton per year. This source primarily burns natural gas or propane. Therefore, this source was not included in the modeling inventory and is accounted for through the regional background concentration.

Table 13 below shows the emission release parameters used for the four boilers at Labadie, and Table 14 includes an excerpt from the hourly emissions file used in the modeling analysis.

Table 13 – Ameren Labadie Energy Center Emission Release Parameters

Facility I.D.	Facility Name	Site Name	Emission Point I.D.	Model ID	Description	Release Type
071-0003	Ameren Missouri	Labadie Plant	1	LABADIE1	Boiler 1	Point
071-0003	Ameren Missouri	Labadie Plant	2	LABADIE2	Boiler 2	Point
071-0003	Ameren Missouri	Labadie Plant	3	LABADIE3	Boiler 3	Point
071-0003	Ameren Missouri	Labadie Plant	4	LABADIE4	Boiler 4	Point

Easting Meters	Northing Meters	Base Elevation Meters	Actual Stack Height Meters	Stack Temperature Kelvin	Stack Exit Velocity Meters/Second	Stack Diameter Meters
688352.17	4270445.59	149.66	213.36	443.06	34.72	6.25
688387.01	4270400.40	149.66	213.36	442.49	35.56	6.25
688435.47	4270332.33	149.66	213.36	433.20	34.52	6.25
688439.28	4270327.43	149.66	213.36	441.71	34.95	6.25

Table 14 – Excerpt from 2012-2014 Hourly CEMS Emission File for Ameren Labadie Energy Center

	Year	Month	Day	Hour	Unit ID	SO ₂ ER (g/s)	Temp (K)	Velocity (m/s)
SO HOUREMIS	12	1	1	1	LABADIE1	248.3657244	443.06	34.72
SO HOUREMIS	12	1	1	1	LABADIE2	215.9340394	442.49	35.558
SO HOUREMIS	12	1	1	1	LABADIE3	233.14526	433.204	34.52
SO HOUREMIS	12	1	1	1	LABADIE4	269.2560639	441.707	34.95
SO HOUREMIS	12	1	1	2	LABADIE1	249.0713089	443.06	34.72
SO HOUREMIS	12	1	1	2	LABADIE2	222.2087011	442.49	35.558
SO HOUREMIS	12	1	1	2	LABADIE3	229.5795386	433.204	34.52
SO HOUREMIS	12	1	1	2	LABADIE4	292.5151511	441.707	34.95

C.3 Meteorology and Topography

Meteorology and topography are interrelated as significant topographical features often cause localized meteorological effects. Due to this related nature, these two factors were evaluated together. Topography and surrounding land features can have a significant impact on the wind patterns and thus the dispersion of air pollutants from emission sources. There are no significant terrain features in the area around Labadie that would greatly impact dispersion, such as

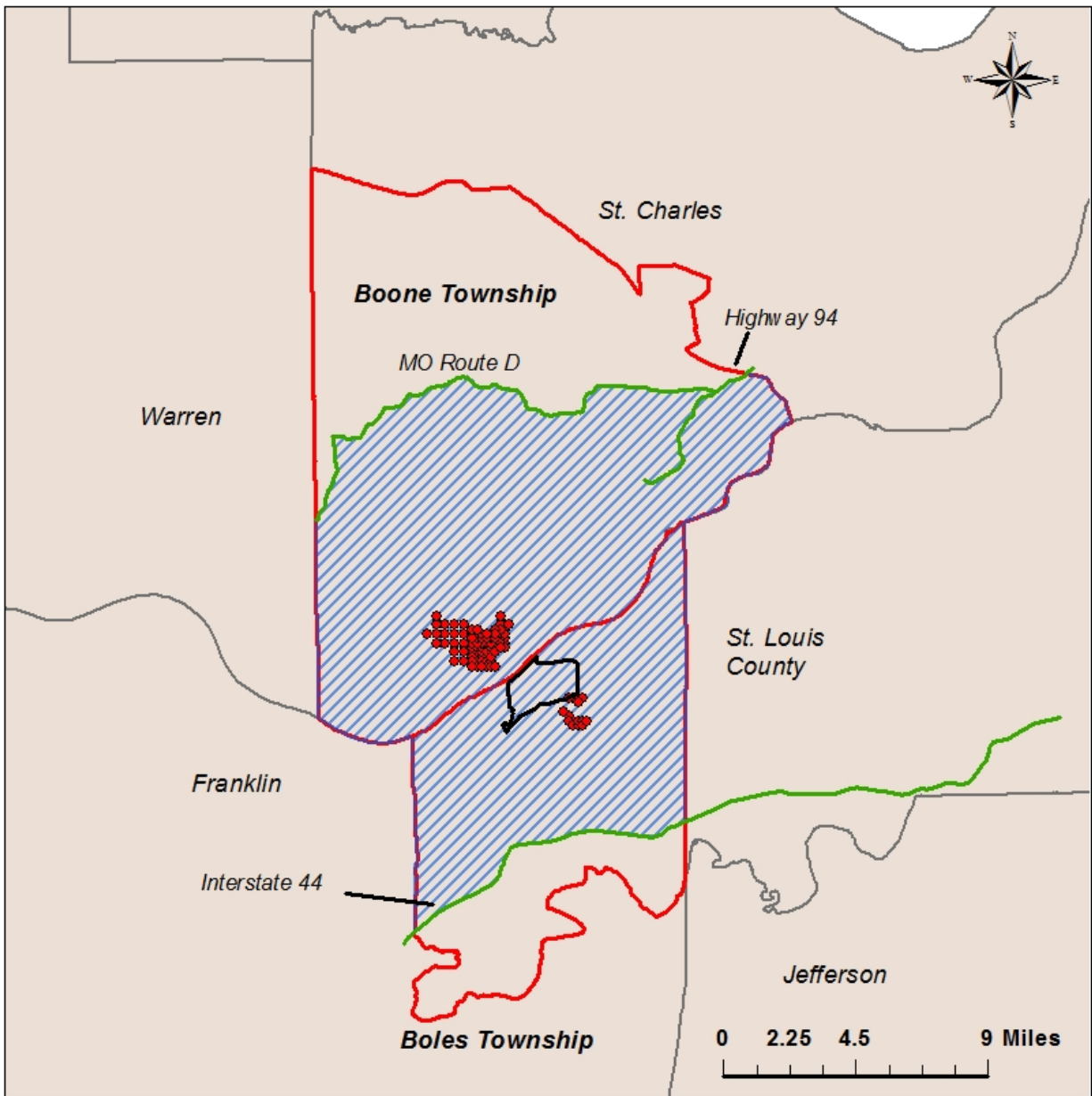
mountain ranges. However, the Missouri river valley and nearby bluffs are near the facility and within the boundary which could cause some localized meteorological effects. Until one complete year of onsite meteorological data is certified for use, the most representative offsite station must be used. In using the most representative offsite weather station, the surrounding terrain and meteorological effects were represented in Labadie's modeling analysis to best simulate monitoring of the area's ambient air quality. Since no other significant terrain or meteorological features exist around Labadie, besides the river valley which is contained within the boundary, topography and meteorology were not used to set the proposed boundaries.

C.4 Jurisdictional Boundaries




Nonattainment area boundaries are typically defined by easily identifiable features such as county, municipal, or township boundaries. Large, immovable features such as rivers or highways can also be used. As discussed previously, the modeling evaluation performed for Labadie resulted in modeled violations of the 2010 1-hour SO₂ NAAQS. To determine an appropriate nonattainment boundary, the EPA recommends using an area that encompasses all modeled violations. The Air Program identified an area that encompasses all modeled violations, the Labadie property boundary, and the new ambient SO₂ monitors and that is bounded by easily recognizable and identifiable landmarks. These landmarks include township boundaries and federal and state roadways. Under option 1, the Air Program seeks public comment on a nonattainment boundary that includes portions of Franklin and St. Charles Counties. The proposed nonattainment area covers approximately 190.8 square miles (or 495 square kilometers). It measures approximately 30 km north to south and 26 km east to west. The proposed nonattainment boundary for option 1 is defined below and displayed in the map in Figure 9.

- The eastern and western boundaries are Boone and Boles Township boundaries.
- The northern boundary is Missouri Route D and Highway 94.
- The southern boundary is Interstate 44.

**Ameren Labadie Energy Center: Proposed 2010 1-hour SO₂
NAAQS Nonattainment Area Boundary for Comment Under Option 1**



Legend

-  Labadie Property Boundary
-  Federal and State Roadway Boundaries
-  Model Predicted Violations
-  Proposed Nonattainment Area Boundary for Comment, Under Option 1
-  Boone and Boles Township Boundaries



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Division of Environmental Quality
Air Pollution Control Program
Prepared: July 23, 2015

Figure 9 – Ameren Labadie Energy Center Proposed 2010 1-hour SO₂ NAAQS Nonattainment Area under Option 1

D. OPTION 2: UNCLASSIFIABLE BASED ON MONITORING DATA

This option presents a proposal for an unclassifiable recommendation based on available SO₂ monitoring data near the Labadie plant. The proposed unclassifiable area boundary for this option is the same as the proposed boundary presented in option 1 (Figure 9).

The air dispersion modeling analysis presented in option 1 contrasts with the available SO₂ monitoring data. The modeling shows violating receptors in the vicinity of Labadie, but actual current and historical measured SO₂ concentrations from the monitors located in this area are below the 1-hour SO₂ standard of 75 ppb. Air dispersion modeling is a computer-generated representation of SO₂ concentrations and has a number of uncertainties due in part to the model's formulation and complexity of the inputs (e.g., emissions and meteorological inputs, release point characteristics, chosen model options). For these reasons, the Air Program seeks comment on a proposed recommendation of unclassifiable for Labadie based on the available ambient SO₂ monitoring data summarized in this section.

D.1 Monitoring Data

Ambient air quality SO₂ monitoring data is available for the area around the Ameren Labadie Energy Center. New ambient monitoring stations recently began operating around Labadie and historical data from former MDNR monitoring sites is available for the area. A map depicting the locations of new and historical monitoring stations is in Figure 10.

New and Historical SO₂ Monitoring Sites around Ameren Labadie

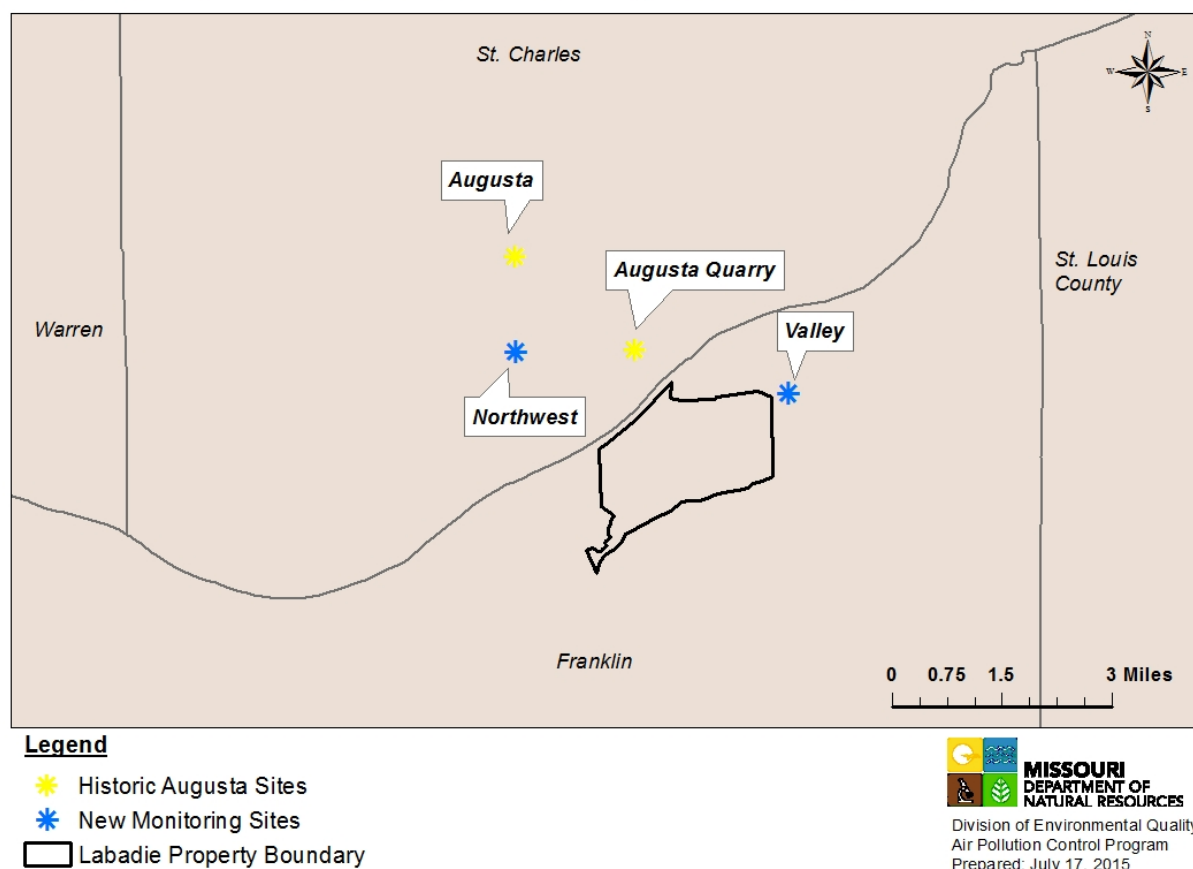


Figure 10 – New and Historical SO₂ Monitoring Sites around the Ameren Labadie Energy Center

Two special purpose SO₂ ambient air monitoring sites were recently added to the SO₂ monitoring network at 226 Labadie Power Plant Road in Franklin, County, MO: the Valley and Northwest monitors. These monitoring sites are operated by Ameren under a department-approved Quality Assurance Project Plan (QAPP). More information on these monitors can also be found in the Air Program's 2015 Monitoring Network Plan. These monitors have been in operation since late April 2015.

Though the data from the new Valley and Northwest monitors is not quality-assured and a complete three-year dataset is not available, preliminary SO₂ concentrations measured at these sites are well below the 1-hour SO₂ standard of 75 ppb. Table 15 summarizes the preliminary data from these monitors, and the full dataset available at the time this document was prepared can be found in Appendix F.

Table 15 – Summary of Available Data from New Special Purpose SO₂ Monitors around Labadie

Summary of Available Data from New Monitors (April 22, 2015 to June 22, 2015)*		
Monitoring Site	Maximum Measured 1-hour SO ₂ Concentration (ppb)*	99th Percentile of Available Hourly SO ₂ Measured Concentrations (ppb)*
Valley	21	6
Northwest	38	4
*Available data is not yet quality assured and does not meet completeness criteria.		

Information on available data from former MDNR ambient air monitoring sites known as Augusta (AQS #29-183-0009) and Augusta Quarry (AQS # 29-183-0010) can be found in the 2015 Monitoring Network Plan and the AirData website (www.epa.gov/airdata). These sites were in operation from 1987-1994 and 1994-1998, respectively, but subsequently discontinued due to relatively low monitored concentrations as compared to the previous SO₂ NAAQS; their continued operation was no longer required by NAAQS compliance monitoring rules in place at that time.

The previous SO₂ standards, established in 1971, were set at 140 ppb (24-hour) and 30 ppb (Annual). Historical monitoring data from the Augusta and Augusta Quarry sites includes periods of recorded SO₂ levels below both the previous and new SO₂ standards. A summary of monitoring data from the Augusta and Augusta Quarry sites is included in Tables 16 through 19.

Table 16 –Historical Augusta Monitor Fourth Highest Monitored SO₂ Concentrations

2010 1-hour SO₂ Standard = 75 ppb				
Augusta 4th Highest Monitored SO₂ Concentrations				
	4th Highest 1-hour Average (ppb)^a			
Augusta*	1st High	2nd High	3rd High	4th High
1987	293	237	228	168
1988	395	379	257	249
1989	344	312	290	178
1990	200	185	138	127
1991	195	171	144	125
1992	308	219	171	160
1993	95	63	62	61
1994	248	163	124	122

Table 17 – Historical Augusta Monitor 99th Percentile 1-hour Averages and Design Values

Augusta* SO₂ 99th Percentiles

99th Percentile 1-Hour Average (ppb)							
1987	1988	1989	1990	1991	1992	1993	1994
237	249	290	127	125	160	61	122

Augusta* SO₂ Design Values

Design Value ^a					
87-89	88-90	89-91	90-92	91-93	92-94
259	222	181	137	115	114

^aAll Quality Assured Data

*Began monitoring on 07/01/1987. Discontinued on 12/19/1994; 1987 and 1989 are not complete years.

Red and Underlined: Violation of the 2010 1-hour Standard of 75 ppb

The highlighted field indicates the data set does not meet the completeness criteria of 40 CFR Part 50 Appendix T, Section 3. Use of incomplete data for designation purposes is subject to EPA approval consistent with 40 CFR Part 50 Appendix T, 3(d).

Data Source: EPA Air Quality System (AQS) Database: AMP480 and AMP440 Reports:
<https://aqs.epa.gov/aqs/>

Table 18 – Historical Augusta Quarry Monitor Fourth Highest Monitored SO₂ Concentrations

2010 1-hour SO ₂ Standard = 75 ppb				
Augusta Quarry 4 th Highest Monitored SO ₂ Concentrations				
	4 th Highest 1-hour Average (ppb) ^a			
Augusta Quarry*	1st High	2nd High	3rd High	4th High
1994	64	39	26	18
1995	149	92	86	86
1996	132	108	73	69
1997	284	133	88	80
1998	76	58	52	52

Table 19 – Historical Augusta Quarry Monitor 99th Percentile 1-hour Averages and Design Values

The Augusta Quarry* SO ₂ 99 th Percentiles and Design Values								
99th Percentile 1-Hour Average (ppb)						Design Value ^a		
1994	1995	1996	1997	1998		94-96	95-97	96-98
64	86	69	80	52		73	78	67

^aAll Quality Assured Data

*Began monitoring on 12/20/1994. Discontinued on 08/31/1998; 1994 and 1998 are not complete years.

Red and Underlined: Violation of the 2010 1-hour Standard of 75 ppb

The highlighted field indicates the data set does not meet the completeness criteria of 40 CFR Part 50 Appendix T, Section 3. Use of incomplete data for designation purposes is subject to EPA approval consistent with 40 CFR Part 50 Appendix T, 3(d).

Data Source: EPA Air Quality System (AQS) Database: AMP480 and AMP440 Reports: <https://aqs.epa.gov/aqs/>

D.2 Emissions Data

Labadie's historical annual SO₂ emissions from 1992 through 2013 are displayed in Figure 11. This figure, which was taken from the 2015 Monitoring Network Plan, illustrates the significant SO₂ emissions reductions at the Labadie Energy Center that occurred over this time period.

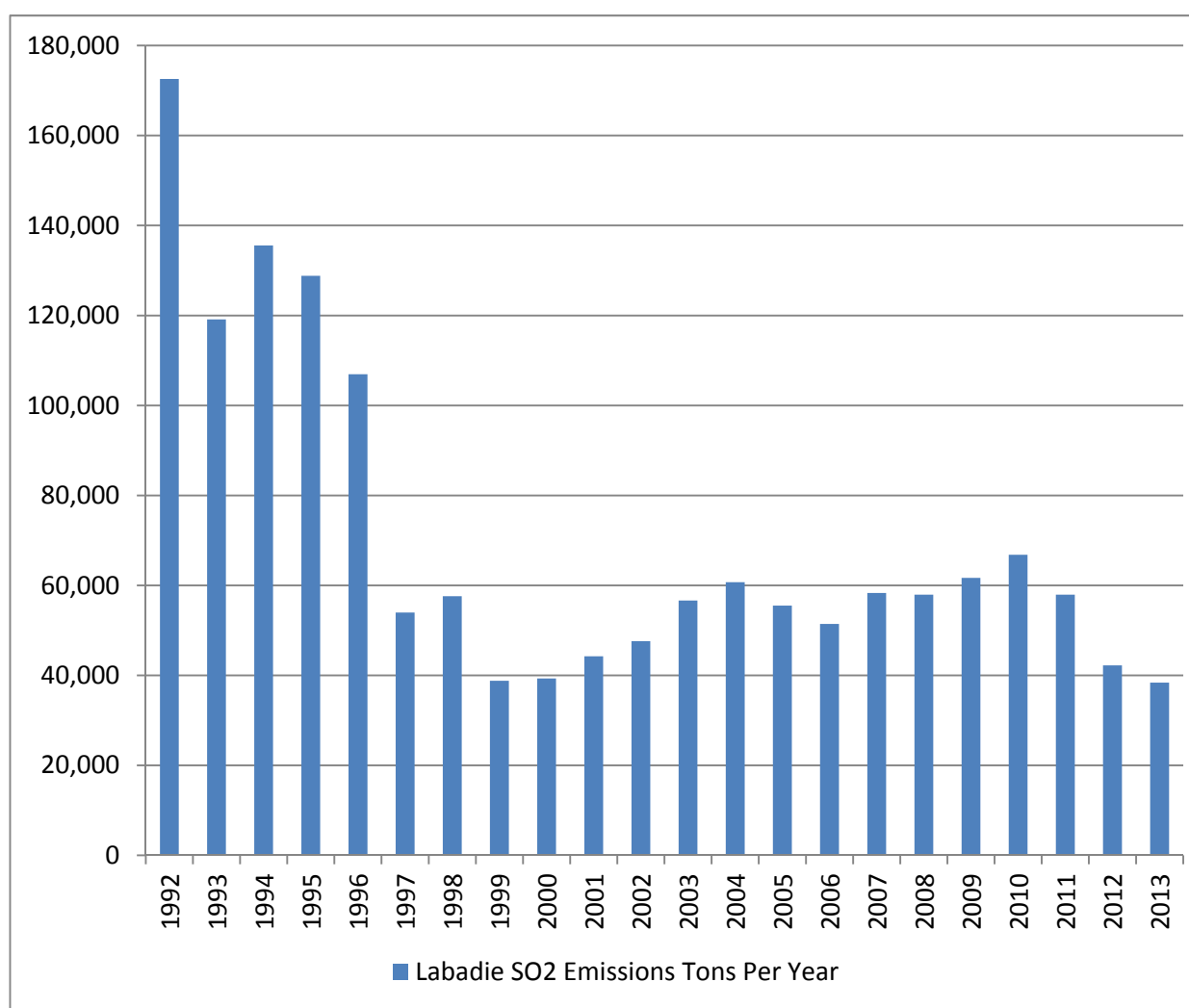


Figure 11 – Labadie SO₂ Emissions Trend (tons per year)

PROPOSED OPTIONS FOR IRON COUNTY

E. BUICK NORTHEAST MONITOR

The Buick Northeast Monitor (AQS ID: 29-093-0034) is located in northeast Iron County, Missouri. It is a source-oriented monitor intended to measure the ambient sulfur dioxide (SO₂) concentrations around Buick Resource Recycling Facility (BRRF). This source is a secondary lead smelter that recycles the lead from car batteries through blasting, melting, and refining processes. The monitor is affected by the March 2015 federal consent decree because its 2012 – 2014 design value is in violation of the 2010 SO₂ NAAQS. The federal consent decree requires that any areas with violating monitors based on recent monitoring data be designated under the 2010 SO₂ NAAQS by July 2016.

Based on preliminary monitoring data at this monitor for the first portion of 2015, the 99th percentile 1-hour average concentration is 34 ppb, which is not expected to significantly change through the remainder of the year. Prior to the July 2, 2016 designations deadline, the 2013-2015 design value is expected to be in compliance with the 2010 1-hour SO₂ NAAQS. At that time, this monitor would no longer be subject to the requirements of the federal consent decree, which eliminates the need for a boundary recommendation from Missouri.

The low magnitude of the violation and the decrease in monitored SO₂ values suggest that the monitor will likely come into compliance based on 2013-2015 data. The 2012-2014 design value for the monitor (76 ppb) is the lowest possible design value that still violates the NAAQS. The low magnitude of the violation provides evidence that widespread violations are not likely occurring. The 99th percentile 1-hour SO₂ concentrations have been decreasing over the last three years at the Buick Northeast monitor showing progress towards compliance with the NAAQS.

Though an attaining monitor for 2013-2015 is likely, the Air Program seeks public comment on a nonattainment area boundary in the event the monitor continues to be in violation for 2013-15. The following sections outline the potential nonattainment area boundary recommendation, which is based on EPA guidance and the evaluation of five factors: 1) air quality data; 2) emissions-related data; 3) meteorology; 4) geography/topography; and 5) jurisdictional boundaries.

E.1 Monitoring Data

Determination of compliance with 1-hour SO₂ NAAQS is codified in 40 CFR 50.17, which states: *The 1-hour primary standard is met at an ambient air quality monitoring site when the three-year average of the annual (99th percentile) of the daily maximum 1-hour average concentrations is less than or equal to 75 ppb.* Table 20 displays the monitoring data from the Buick Northeast Monitor. This table shows the 1-hour SO₂ design value from 2012 – 2014 is 76 parts per billion (ppb), which violates the 2010 1-hour SO₂ NAAQS of 75 ppb. However, preliminary data for 2015-to-date indicates concentrations that will bring this monitor into compliance by the end of 2015. The low magnitude of the violation and the decrease in monitored SO₂ values as discussed above gives justification for a proposed nonattainment boundary that is smaller than the presumptive county boundary.

Table 20 – Summary of Buick Northeast SO₂ monitored concentrations 2012-2014 (ppb)

Monitor Name	AQS Site ID	2012*	2013*	2014*	2015**	2012 – 2014 Design Value	2013 – 2015 Preliminary Design Value**
Buick NE	29-093-0034	91	85	52	34	76	57

*The annual SO₂ concentrations listed in Table 1 represent the 99th percentile of the daily maximum 1-hour average concentrations observed during the year.

**Preliminary data (as of 7/13/15) that has not been quality assured or certified and does not represent a complete dataset.

E.2 Emissions Data

Figure 12 displays a map of Iron, Crawford, Dent, Reynolds, and Washington Counties. The blue circle on the map shows a 20 km radius surrounding the Buick Northeast monitoring site. Because there are no other permitted SO₂ sources within 20 km from the violating monitor, no other point sources were considered for inclusion in the proposed nonattainment area. As mentioned previously, the Buick Northeast monitoring site is a source oriented monitor intended to measure the ambient SO₂ concentrations around BRRF. This further supports a proposed nonattainment boundary smaller than county level.

Table 21 displays BRRF's 2012-2014 annual SO₂ emissions. As seen in Table 21, the emissions from the facility were significantly reduced in 2014. This can be attributed to the facility's recent installation and operation of a scrubber to control SO₂ emissions from the main reverberatory furnace stack. This has resulted in a continued decrease in both SO₂ emissions from the facility and monitored SO₂ concentrations near the facility. The scrubber was installed in April 2012 and ongoing efficiency improvements have been made since the installation, according to the facility. The construction permit authorizing the installation of the scrubber became effective June 8, 2011⁶. Based on a review of the data, it is probable that the monitor located near Buick will come into compliance with the 2010 1-hour SO₂ NAAQS based on 2013-2015 air quality data.

⁶ Construction Permit #062011-004.

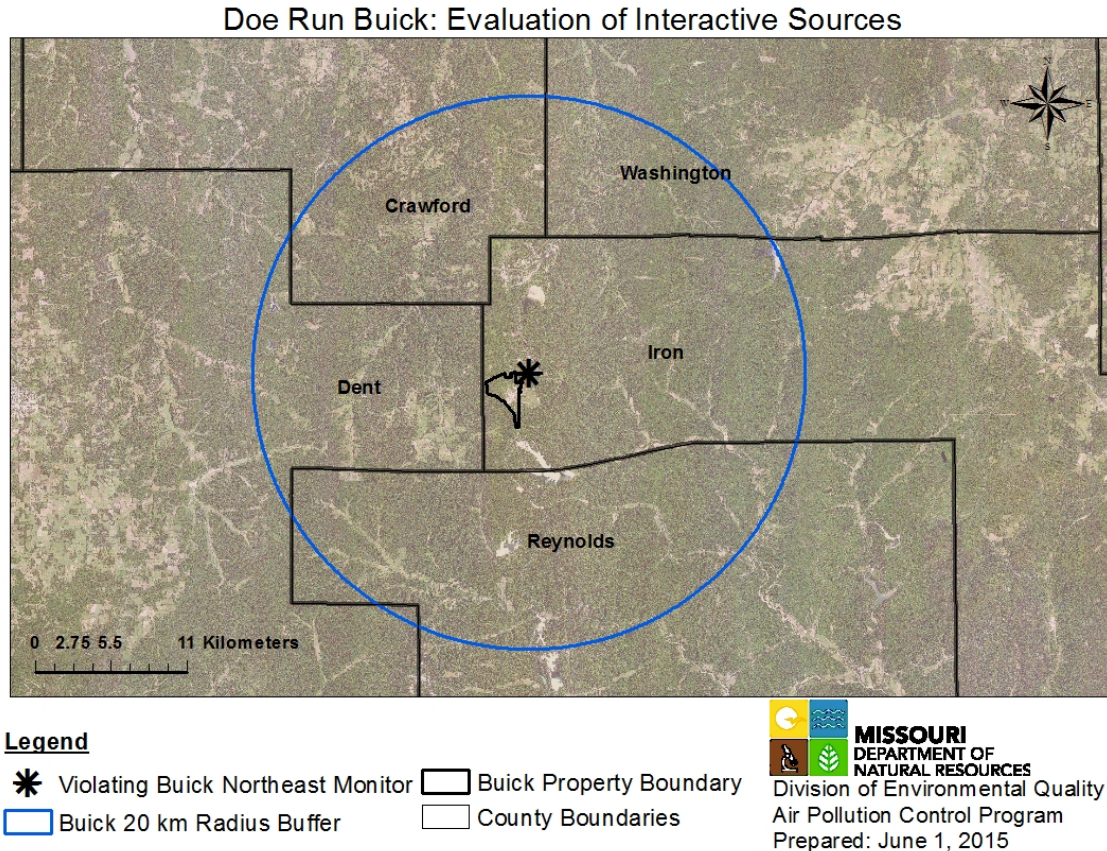


Figure 12 – Buick Northeast Monitor Location with Domain for Evaluating Interactive Sources

Table 21 – Doe Run Buick Smelter 2012 - 2014 SO₂ Emissions

Doe Run Buick Smelter Annual SO ₂ Emissions			
Year	2012	2013	2014
SO ₂ Emissions (tons/year)	2,853	2,962	1,649

E.3 Meteorology

The location of BRRF in the hilly, forested land of the Missouri Ozarks, affects the surface weather elements near Buick, specifically wind and temperature data. BRRF is required to collect and record surface meteorology data as part of post-construction monitoring required by Permit # 012005-008, special condition 31, issued January 26, 2005, and continued through the 2013 Consent Judgment section V.9.C. The current consent judgment requires the continuation of meteorological monitoring to support future dispersion modeling and the development of a quality assurance project plan (QAPP). The QAPP submitted by BRRF has been approved as of 2014, and quality assured data is currently available for partial 2013 through partial 2015. The

data include wind speed and direction, temperature, pressure, humidity, and precipitation. Additional data elements collected within 6 months of the Consent Judgment include temperature difference between 2 and 10 meter heights and incoming solar radiation. The meteorological data is collected at the “Buick South” location, which is approximately 1,000 meters from the southern property line of the facility, and collocated with a lead sampler for ambient air.

Figure 13 displays the October 2013-March 2015 wind rose data collected at the onsite meteorological station at BRRF. Figure 14 is a bar graph of the wind speeds collected at this site for the same time period. As seen in Figure 13, winds in the area predominantly blow from the S, SSW, and SSE directions with a large portion of winds also coming from the NW direction. The strong southerly wind component gives confidence that the monitor located NNW of BRRF likely captures a significant portion of days when winds are blowing emissions from BRRF towards the monitor. Additionally, as seen in both Figures 13 and 14, over 78% of the wind speeds in the area were below 3.6 m/s and over 97% of the wind speeds below 5.7 m/s. This high percentage of low wind speeds in the area further support a conclusion that violations are not likely occurring at great distances from BRRF, which provides more justification of a proposed nonattainment boundary that is smaller than county level.

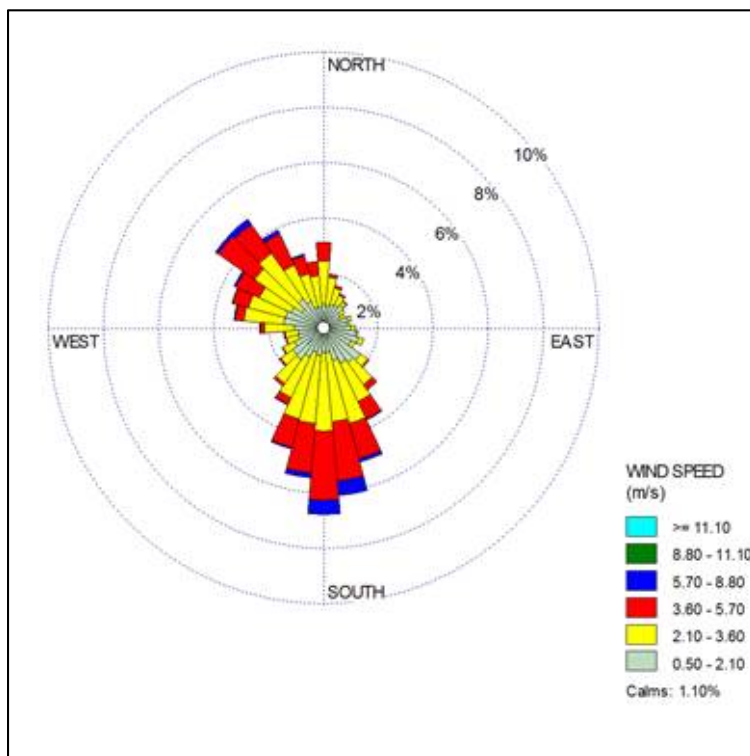


Figure 13 – BRRF Wind Rose (October 2013 - March 2015)

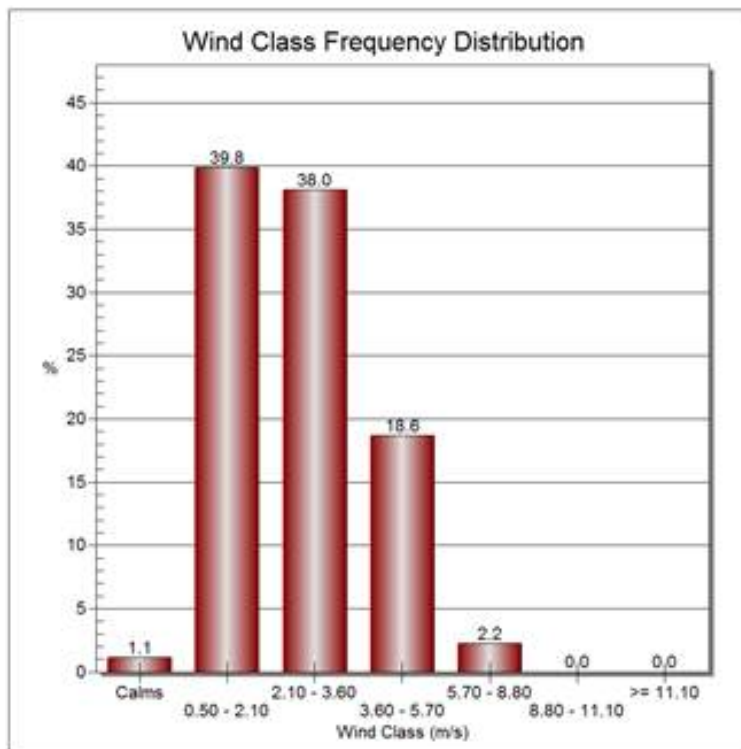


Figure 14 – BRRF Wind Speed Distribution (October 2013 - March 2015)

E.4 Topography

There are no significant topographical features near the violating Buick Northeast monitor that could act as an air shed barrier or channel such as valleys or mountain ranges. Therefore, topographical features were not considered during the evaluation of the violating monitor.

E.5 Jurisdictional Boundaries

Nonattainment area boundaries are typically defined by easily identifiable features such as county, municipal, or township boundaries. Large, immovable features such as rivers or highways can also be used.

If the Iron County monitor continues to be in violation of the 2010 1-hour SO₂ standard for 2013-2015, the Air Program would submit a boundary for EPA to consider when designating the nonattainment area. The proposed boundaries for this nonattainment area consist of county and township boundaries that qualify as both easily definable and identifiable jurisdictional boundaries. The proposed area includes the single source (Buick Resources Recycling Facility) for which the monitor was sited, as well as the Buick Northeast monitor. The proposed nonattainment area boundary is described below and displayed in the map in Figure 15.

- The portion of Township 34N that is located within Iron County

Doe Run Buick: Proposed 2010 1-hour SO₂ NAAQS Area Boundary for Comment

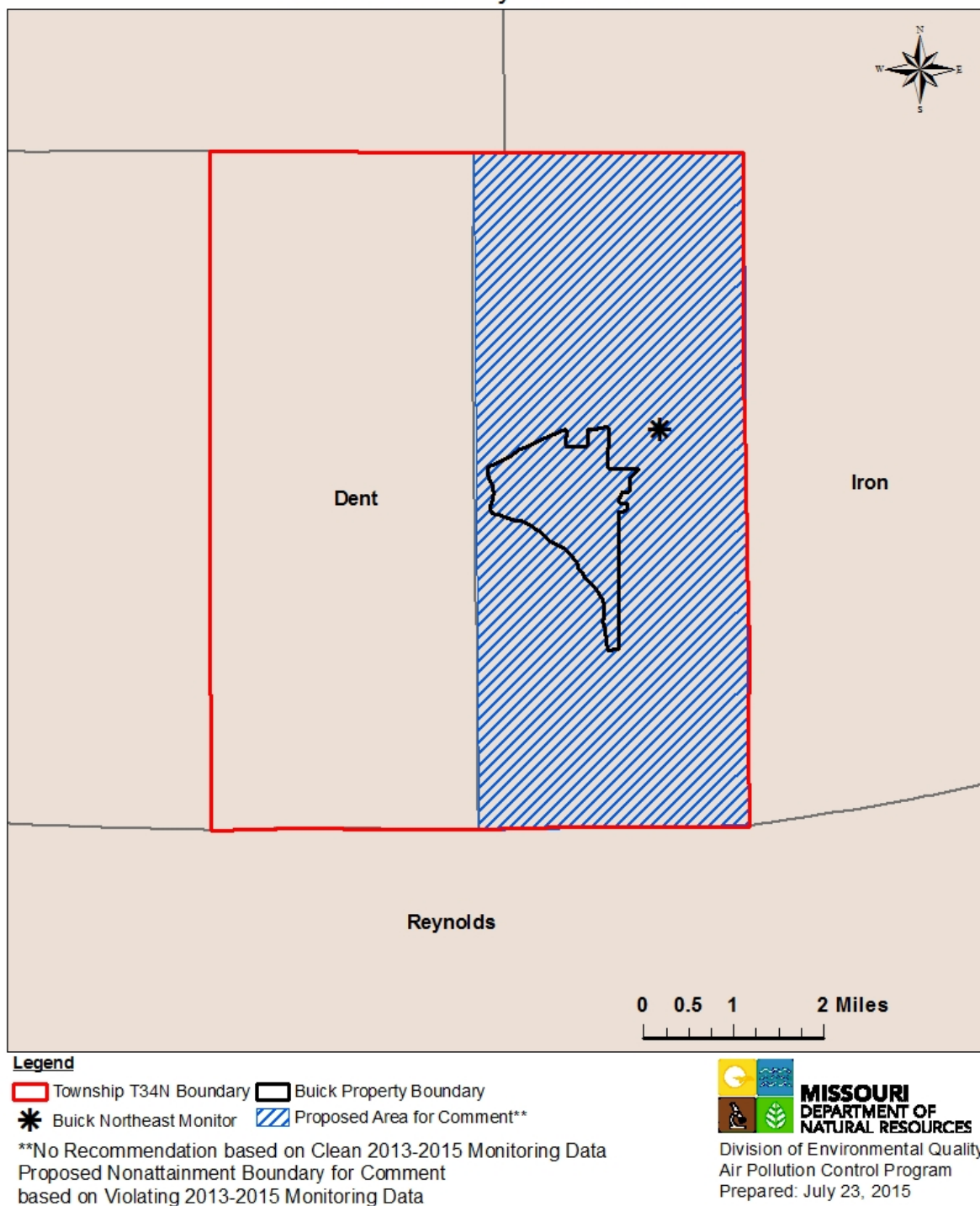


Figure 15 – Doe Run Buick Proposed 2010 1-hour SO₂ NAAQS Nonattainment Area Boundary